ENVIRONMENTAL ASSESSMENT

In the Matter of the Xcel Energy and Dairyland Power Cooperative Applications for a Route Permit and a Certificate of Need for the Chisago County to Apple River 115/161 kV HVTL Project

PUC Docket No. E002,ET3/CN-04-1176
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Responsible Governmental Unit

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Abstract

Northern States Power Company d/b/a Xcel Energy (Xcel Energy) and Dairyland Power Cooperative (Dairyland) made applications to the Minnesota Public Utilities Commission ("PUC" or "Commission") for a Certificate of Need and Route Permit for the Chisago County to Apple River Transmission Line Project ("Chisago Transmission Project" or "Project") on November 15, 2006 and January 5, 2007 respectively, pursuant to the provisions of Minnesota Statutes 216B.243 and 216E.

Xcel Energy is proposing to rebuild an existing high voltage transmission line from the existing Chisago substation in Chisago County, Minnesota to the Apple River Substation near Amery, Wisconsin. The line would be rebuilt from 69 kilovolts (kV) to 115 kV from the Chisago Substation to a new Lawrence Creek Substation near Taylors Falls. From there, the line would be rebuilt to 161 kV to the Wisconsin connection. The Minnesota portion of the line is approximately 18 miles in length. The Project is designed to correct deficiencies in the 69 kV load serving system of East Central Minnesota and Northwestern Wisconsin.

The Department of Commerce, Energy Facilities Permitting (EFP) typically prepares the Environmental Report (ER) required for the Certificate of Need and the Environmental Assessment (EA) required for the Route Permit Application. On February 12, 2007, the PUC issued an Order allowing the Department to combine the environmental review for the dockets and prepare an EA *in lieu* of the ER, as provided for under Minnesota Rule 4410.7060, subp. 1.

Persons interested in these matters can register their names on the Project Docket webpage at http://energyfacilities.puc.state.mn.us/Docket.html?Id=18938 or by contacting David Birkholz, Energy Facilities Permitting, 85 7th Place East, Suite 500, St. Paul, Minnesota 55101, phone (651) 296-2878, e-mail: david.birkholz@state.mn.us. Documents of interest can be found at the above website or by going to https://www.edockets.state.mn.us/EFiling/search.jsp and entering "04-1176" or "06-1677" as the search criteria.

(Cover Photo: A simulation of the proposed project through the city of Lindstrom)

Acronyms, Abbreviations and Definitions

AADT	Annual Average Daily Traffic
ACSS	Aluminum Conductor Steel Supported
BMP	best management practice
CBD	Central Business District
COE	Corps of Engineers
Commission	Minnesota Public Utilities Commission
CON	Certificate of Need
CPCN	Certificate of Public Convenience and Necessity
CSAH	County State Aid Highway
CWI	Minnesota County Well Index
dB	decibels
dBA	A-weighted sound level recorded in units of decibels
d/b/a	doing business as
DLM	Division of Land and Minerals
DNR	Department of Natural Resources
DOC	Department of Commerce
EA	Environmental Assessment
EFP	Department of Commerce Energy Facilities Permitting
EMF	electromagnetic field
EPA	United States Environmental Protection Agency
EQB	Environmental Quality Board
G	Gauss
G&T	Generation and Transmission Cooperative
HDR	HDR Engineering, Inc.
HVTL	high voltage transmission line
Hz	Hertz
kV	kilovolt
kV/M	Kilovolt per meter
MCBS	Minnesota County Biological Survey
MDH	Minnesota Department of Health
mg/L	milligrams per liter – equivalent to parts per million (ppm)
MN DNR	Minnesota Department of Natural Resources
MN DOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
NAC	noise area classification
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NEV	Neutral-to-Earth Voltage
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollution Discharge Elimination System

NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PEBC	Prairie Ecology Bus Center
ppm	parts per million
PUC	Public Utilities Commission
PWI	Public Waters Inventory
ROW	Right-of-Way
SFD	Swan Flight Diverter
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
TLE	Temporary Limited Easement
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPA	Waterfowl Production Area
WMA	Wildlife Management Area
WPSC	Wisconsin Public Service Commission
WSR	Wild and Scenic River

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1.0 Introduction

On November 15, 2006, Xcel Energy and Dairyland filed an application for a certificate of need and on January 5, 2007, filed an application for a route permit for the Chisago High Voltage Transmission Line (HVTL) Project.

Xcel Energy, headquartered in Minneapolis, Minnesota is a wholly-owned subsidiary of Xcel Energy Inc., the fourth-largest combination electricity and natural gas energy company in the United States. Xcel Energy, Inc. owns over 17,300 miles of electricity transmission lines and operates regulated power plants that generate approximately 15, 246 MW of electric power. Xcel Energy provides electricity services to approximately 1.3 million residential, commercial and industrial customers in Minnesota.

Dairyland is a generation and transmission cooperative headquartered in La Crosse, Wisconsin that provides wholesale electrical requirements and other services for 25 electric distribution cooperatives and 19 municipal utilities in the Upper Midwest. Dairyland's generating capacity consists of more than 1,100 MW of capacity. Dairyland maintains and operates 3,100 miles of transmission lines and 300 substations.

The Minnesota Department of Commerce ("DOC" or "Department") is required to perform environmental review on applications for Certificates of Need and Route Permits. This process is undertaken to inform the public, the Applicants and decision makers concerning potential impacts and possible mitigations for the project and any alternatives. In the matter of the Chisago Transmission Project, the PUC authorized the DOC to combine the environmental review for both the Certificate of Need and the Route Permit into a single document in an effort to streamline the regulatory and public participation process. Historically the environmental review requirement for projects of this nature has been met by developing two separate documents, an Environmental Report for the Certificate of Need application and an Environmental Assessment for the Route Permit application. This EA document covers the environmental review requirements for both the Certificate of Need and Route Permit.

Chapters 1 and 3 provide specific information about the proposed project. Chapter 2 provides information on the regulatory process for both the Certificate of Need and the Route Permit processes. Chapters 4 and 5 describe and analyze alternatives to the proposed Project that attempt to reduce, mitigate or eliminate the need for the proposed transmission line. This analysis of alternatives is required by Minnesota Rule 7849.0230 and 4410.7035 for the CN application.

Chapters 6 through 9 provide the analysis required for route permit applications under Minnesota Rule 4400.2750. Chapter 6 addresses the human and environmental impacts of Xcel Energy's proposed transmission line and route. Chapter 7 describes and analyzes alternatives to the proposed route. Chapter 8 addresses the unavoidable impacts of the proposed route, and Chapter 9 describes the additional permits that may be required for this project.

1.1 Project Description

Xcel Energy proposes to upgrade the existing 69 kV transmission line from the Chisago County Substation to the St. Croix River in Taylors Falls, Minnesota to a higher voltage. The Project transmission line proposal is shown in Figure 1 in Appendix B, and is broken down into the following components:

Transmission Line

- A conversion of 4.9 miles of the existing 69 kV transmission line to 115 kV between the Chisago County Substation and CSAH 19,
- A rebuild of 2.2 miles of the existing 69 kV transmission line to 115 kV between CSAH 19 and the Lindstrom Substation,
- A rebuild of 2.8 miles of the existing 69 kV transmission line to 115 kV between the Lindstrom Substation and the Great River Energy (GRE) Shafer Substation tap,
- A rebuild of 6.1 miles of the existing 69 kV line to 115 kV east of the Shafer Substation tap, and a 0.2 mile new alignment into the new Lawrence Creek Substation near Taylors Falls,
- A rebuild of 1.4 miles of the existing 69 kV transmission line to 161 kV operation between the new Lawrence Creek Substation and CSAH 20 in Taylors Falls, and a 0.4 mile new alignment where the line enters the Lawrence Creek Substation,
- A rebuild of 0.4 miles of the existing 69 kV transmission line to a buried 161 kV transmission line between CSAH 20 and TH 95 in Taylors Falls,
- A rebuild of 0.3 miles of the existing 69 kV transmission line to 161 kV between TH 95 and the St. Croix Falls Substation, and
- A realignment of 0.25 miles of the existing 69 kV Arden Hills line to enter the Lawrence Creek Substation.

Substations

- Modifications to equipment at the existing Chisago County and Shafer substations to change the line operation from 69 kV to 115 kV,
- Modifications to equipment and expansion of the existing Lindstrom substation to change the voltage from 69 kV to 115 kV, and
- Construction of a new Lawrence Creek Substation.

The transmission line upgrades are primarily along existing right-of-way (ROW); however, a small section of new alignment is required for this Project to interconnect the new Lawrence Creek Substation to the existing transmission system. The minor addition to the footprint of the Lindstrom Substation, and minor modifications to the existing Chisago County, Lindstrom and Shafer substations would be required to accommodate the new transmission lines.

1.2 Project Location

The Project will be located in Chisago County, Minnesota. Table 1 provides the township, ranges and sections in which the line is proposed:

Table 1. Project Location

County	Township	Range	Sections
Chisago	34N	21W	1, 12, 13, 24, 25
		20W	25, 26, 29-36
		19W	24-35
		18W	19, 30

1.3 Project Purpose

According to studies by the Applicants, the existing 69 kV system serving parts of Chisago County, Washington County, Ramsey County and Polk County (Wisconsin) cannot reliably meet the demand for electricity should a critical element fail during high use periods.

The Applicants' proposal is designed to resolve the deficiencies identified in the northeastern metropolitan fringe area through 2015 and perhaps longer. Failing to install the intended upgrades, according to the Applicants, the 69 kV system will not be able to reliably meet the current and projected growth in demand for power in this area.

1.4 Sources of Information

Much of the information used in this EA is derived from the *Application to the Minnesota Public Utilities Commission for a Certificate of Need*, dated September 7, 2006, and the *Chisago County to Apple River Transmission Line Route Permit Application*, dated January 5, 2007. The applications, maps, appendices, and other documents may be viewed on eDockets at https://www.edockets.state.mn.us/EFiling/search.jsp. Route Permit documents are also available at the EFP website at http://energyfacilities.puc.state.mn.us/Docket.html?Id=18938.

First hand information was gathered by EFP staff field inspection and review of aerial photography along the proposed route.

Other information sources include the National Park Service, World Health Organization, Environmental Assessments and Environmental Impact Statements prepared by Department of Commerce, Energy Facilities Permitting staff on other transmission line projects, and certificate of need and route permit applications to the PUC for similar projects.

Additional information sources include:

- Minnesota Pollution Control Agency (http://www.pca.state.mn.us)
- Minnesota Department of Health (http://www.health.state.mn.us)
- Minnesota Department of Transportation (http://www.dot.state.mn.us)
- Minnesota Department of Natural Resources (http://www.dnr.state.mn.us)
- United States Census Bureau (http://www.census.gov)

2.0 Regulatory Framework

A certificate of need (CN) is required for this case to determine if the Chisago Transmission Project is in the best interests of the State. Additionally, if a CN is issued, a route permit would be issued after a process to assess the best route for the transmission line. The Minnesota Public Utilities Commission has jurisdiction over both the Certificate of Need and the Route.

The Commission has one year from the time a Certificate of Need Application is submitted to reach a final decision (Minnesota Statute 216B.243, subd. 5). A route permit under the Alternative Permitting Process would normally be issued within six months (Minnesota Statute 216E.04, subd. 7), but Minnesota Rule 4400.1900, subp. 3 prohibits the Commission from making a final decision on a route permit until the Certificate of Need is approved.

2.1 Certificate of Need

Minnesota Statutes section 216B.243, subdivision 2, provides that "No large energy facility shall be sited or constructed in Minnesota without the issuance of a certificate of need by the [public utilities] commission pursuant to sections 216C.05 to 216C.30 and this section and consistent with the criteria for assessment of need." A large energy facility is defined in Minnesota Statutes section 216B.2421 subdivision 2(3) as, among other things, "any high-voltage transmission line with a capacity of 100 kilovolts or more with more than ten miles of its length in Minnesota."

A Certificate of Need is required because the Project consists of a transmission line in excess of 100 kV and is more than ten miles in length.

Minnesota Rules chapter 7849 governs the consideration of applications for certificates of need by the PUC. On November 15, 2006, Applicants filed an application to the PUC for a Certificate of Need. The Commission accepted the application as complete and turned the case over to the Office of Administrative Hearings (OAH) for a Contested Case Hearing on February 12, 2007.

2.2 Route Permit

The Applicants are required to obtain a Route Permit from the PUC identifying the route along which the new transmission line can be built. The Route Permit would also authorize the necessary substation modifications.

Since this project is a transmission line between 100 and 200 kV it qualifies for the Alternative Review Process. The Alternative Review Process is shorter than the process required for transmission lines over 200 kilovolts. It does not require applicants to propose alternative routes, but they are required to disclose any rejected routes.

An application for a Route Permit for a proposed new HVTL is considered by the PUC in accordance with the requirements of Minnesota Rules 4400. These rules require that a number of procedural steps be followed in considering any transmission line project, including providing

public notice of the project and holding a public information meeting shortly after a permit application is accepted, preparing an Environmental Assessment, holding a Public Hearing after the EA is completed, and bringing the matter to the PUC for a final decision.

The Applicants notified the Commission on December 4, 2006, of their intent to utilize the Alternative Review Process and file its Route Permit Application under Minnesota Rules parts 4400.2000 to 4400.2950. The Applicants filed a Route Permit application for this matter on January 5, 2007. The PUC has combined these Certificate of Need and Route Permit proceedings into one proceeding, which is consistent with the goal of the Legislature to simplify public participation and to expedite agency review and decision-making. On February 12, 2007, the PUC issued Orders allowing the DOC to combine the environmental review documents and joined the public hearings for both the Certificate of Need and Route Permit proceedings for this matter.

2.3 Scoping Process

The process the Department must follow in preparing the EA is set forth in Minnesota Rules part 4400.2750. This process requires the Department to schedule at least one public meeting in the area of the proposed Project. The purpose of the meeting is to advise the public of the Project and to solicit public input into the scope of the environmental review. A "scope" is a determination of what needs to be assessed in the environmental review in order to fully inform decision-makers and the public about the possible impacts of a project or potential alternatives.

The public meeting for this project was held on February 27, 2007 in Lindstrom, Minnesota. Representatives of the Department and Xcel Energy were available at the meeting to discuss the project and the process and to answer questions. The comment period for interested parties to comment on the project was open until March 30, 2007.

In its February 12, 2007 Order, the Commission recommended that EFP assemble an Advisory Task Force to solicit input into the scope of the EA. EFP did not get sufficient response from local governments to convene a statutory Advisory Task Force. However, EFP convened a working group of interested local governments and citizens to garner input concerning local issues to be addressed in the EA. EFP met with this group three times, and the group submitted a report and recommendations to the Department.

After these processes, EFP reviewed the public comments on the scope of the environmental review and the comments and recommendations of the working group. Based on that review, the Commissioner of the Department of Commerce issued a Scoping Order on April 19, 2007, as required by rule. The Scoping Decision is included in Appendix A of this EA.

2.4 Environmental Assessment Process

As part of its review of the applications for a Route Permit and Certificate of Need, EFP is required to prepare an EA. The EA evaluates the potential impacts of the project along the route

proposed by the applicant and along possible alternative route segments that are identified. The EA also discusses ways to mitigate these potential impacts. The EA also includes analysis of the alternatives defined in Minnesota Rule 4410.7035, as required for an Environmental Report. The public was given an opportunity to participate in the development of the scoping decision as described above, which identified the routes and impacts that are evaluated in this EA.

As per the Administrative Law Judge *Second Prehearing Order* of May 20, 2007, the completed EA was due on August 20, 2007. The Department has published notice in the *EQB Monitor*, a bi-weekly publication of the Environmental Quality Board that can be accessed on the EQB webpage www.eqb.state.mn.us/monitor.html, and has mailed notice to persons who have registered their names with the Department to receive notices about this project.

2.5 Public Hearing

After the EA is completed, a public hearing will be held to again solicit public input and to create an administrative record. The hearing will be a joint hearing before an Administrative Law Judge to consider both the Certificate of Need and the Route Permit. Interested persons will be notified of the public hearing and will have an opportunity to participate in the proceeding. The ALJ set the dates of the hearing to begin on September 4, 2007, and run through September 10, 2007, if needed. Post hearing comments will be due by September 14, 2007.

Once the hearing is concluded, the ALJ will transfer the record to the PUC for its decision. The Commission will again afford interested persons an opportunity to comment.

3.0 Proposed Project

The project proposes to upgrade the existing 69 kV transmission line from the Chisago County Substation to the St. Croix River in Taylors Falls, Minnesota to higher voltages and build a new Lawrence Creek substation near Taylors Falls. This section describes the physical attributes of the project, as well as the land requirements and construction and restoration methods for the proposed transmission line and substation modifications.

3.1 Route Description

Xcel Energy is requesting that the Commission grant a route permit for the Project as described below and shown on the route maps (see Appendix A). Xcel Energy has requested that a 13.4-mile route be approved that follows a 100-foot width from each side of the centerline (200 feet total) for the majority of a designated route. This would allow Xcel Energy reasonable flexibility in locating the transmission line along the rebuild portions of the route. In the vicinity of the new alignments going into and out of the proposed Lawrence Creek Substation, Xcel Energy requests a wider route width in order to provide for flexibility in siting the substation and transmission line configurations. The Project has five distinct segments, as described below.

Segment 1 (see Map 2 in Appendix A) begins approximately 900 feet west of the intersection of Karmel Avenue and Stacy Trail/CSAH 19 and terminates at the Lindstrom Substation. It is approximately 2.2 miles in length. From its starting point west of Karmel Avenue, the route follows Stacy Trail/CSAH 19 approximately 1.9 miles east to Lincoln Road, where it turns south along Lincoln Road approximately 1,280 feet to the Lindstrom Substation, which it would enter from the west. The existing structures in this segment are not capable of supporting the proposed 115 kV line and would be replaced.

Segment 2 (see Map 3 in Appendix A) rebuilds the 69 kV line to 115 kV from Lindstrom Substation to Shafer Substation. It would follow the existing 69 kV transmission line ROW through the cities of Lindstrom and Center City for approximately 2.8 miles to the Shafer Substation. The existing structures in this segment are not capable of supporting the proposed 115 kV line and would be replaced.
The proposed transmission line would continue along the alignment of the existing 69 kV line and follow U.S. Highway 8 from just east of Elm Street to Center City. At Center City, the line would leave U.S. Highway 8 and continue northeast along the existing transmission ROW, crossing the northeastern edge of South Center Lake to the tap point into Shafer Substation.

Segment 3 (see Map 3 in Appendix A) follows County Road 82/310th Street for approximately 6.1 miles, until it reaches the site for the new Lawrence Creek Substation. The existing structures in this segment are not capable of supporting the proposed 115 kV line and would be replaced. The new substation is proposed to be located in the southwest quarter of Section 26, Township 34N, Range 19W. In order to enter the new Lawrence Creek Substation, the transmission line would follow a new alignment for approximately 0.22 miles north from County Road 82/310th Street in the vicinity of the half section of Section 26. The exact alignment of

this section of the route would be determined once the location of the Lawrence Creek Substation has been finalized.

Approximately 0.49 miles of the existing transmission line would be removed for this reroute. At the substation, the voltage of the transmission line would change from 115 kV to 161 kV. The existing 69 kV line from Arden Hills, Minnesota would be doubled-circuited with the 115 kV line on the new 0.22 mile segment as it terminates at the Lawrence Creek Substation. Additionally, approximately 0.25 miles of the existing Arden Hills single-circuit 69 kV line would be rerouted to re-position the line for the double-circuit segment. The exact position of this re-alignment would depend on the final placement of the Lawrence Creek Substation.

Segment 4 (see Map 4 in Appendix A) is a 1.4-mile 161 kV segment from the proposed Lawrence Creek Substation to the top of the west bluff of the St. Croix River at Chestnut Street/CSAH 20. This segment is along a new alignment for approximately 0.4 miles east of the Lawrence Creek Substation, where it then turns northeast and follows the existing 69 kV line corridor for approximately one mile. The existing structures in the rebuild portion of this segment are not capable of supporting the proposed 161 kV line and would be replaced.

Segment 5 (see Map 4 in Appendix A) follows the existing 69 kV line alignment for approximately 0.7 miles from the top of the west bluff to the St Croix River crossing. To mitigate visual impacts to the St. Croix River Valley, the 161 kV transmission line is proposed to be constructed underground from the top of the bluff to the base of the bluff at TH 95. From TH 95 east to the river crossing, the proposed line would be constructed aboveground. As part of the rebuild, Xcel Energy would remove the existing overhead transmission line and all existing distribution lines from the west bluff. At the river crossing, the Project would result in a net reduction of 10 wires crossing the river (the removal of 15 existing wires crossing the river and installation of three conductors and two shield wires).

3.2 Right of Way Requirements

The Project follows existing utility and public ROW for 97 percent of the route, except where indicated on Table 2.

Table 2. Summary of ROW

Description	Length (miles)	Existing Transmission ROW (miles)	Municipal ROW (miles)	County Highway ROW (miles)	U.S. Highway ROW (miles)	New ROW (miles)
Segment 1	2.2	2.2	0	2.2	0	0
Segment 2	2.8	2.8	0.8	0	1.3	0
Segment 3	6.3	6.1	0	6.1	0	0.2
Segment 4	1.4	1	0	0	0	0.4
Segment 5	0.7	0.7	0	0	0	0

Xcel Energy anticipates that the only new ROW that would be required is where approximately 0.8 miles of new easements are needed to tie the transmission lines into the new Lawrence Creek Substation. This would include the new alignment of the 115 kV line from the Shafer Substation tap entering the substation from the south, the new alignment of the 161 kV line to Wisconsin exiting the substation to the east, and the reroute of the existing Arden Hills 69 kV line into the substation from the south. Unless otherwise noted, the ROW that would be acquired from landowners for the transmission line would be 50 feet wide (25 feet each side of the transmission line centerline).

The existing ROW consists of a combination of easements, road ROW and fee-owned property. Xcel Energy would acquire easements for the areas where the transmission line would follow new ROW or require additional ROW. In general, the Project would be designed to fit along a 50-foot easement, which is the same as the easement for the existing 69 kV line. Where the Project parallels a road, the required width would overlap the road ROW. When the transmission line is following a cross-country route, the ROW width would be 50 feet.

3.3 Transmission Structures and ROW Design

Xcel Energy proposes to use several types of structures for the Project, depending upon the segment. Single wood pole, horizontal post (braced post where applicable), two-pole wood H-frame (used for wide wetland crossings in Center City and Taylors Falls) and steel single pole davit-armed poles would be used throughout the Project, varying according to landscape and land use surrounding individual structures.

All portions of the overhead transmission line would use a 795 kcmil 26/7 ACSS. Average loading on the 115 kV line once it is in service is expected to be 117 mVA. Average loading at the in-service date for the 161 kV line is expected to be 108 mVA. For lightning protection, Xcel Energy would use 3/8-inch EHS steel shield wire.

The proposed transmission line and substation upgrades would be designed to meet or exceed all relevant state codes and the standards of the North American Electric Reliability Council (NERC) and Xcel Energy. Appropriate standards would be met for construction and installation, and all applicable safety procedures would be followed during and after installation. The proposed transmission lines would be equipped with protective devices that would de-energize the transmission line to safeguard the public should an accident occur and a structure or conductor fall to the ground. In addition, substation facilities would be fenced and access limited to authorized personnel. The underground portion would be properly marked and manhole covers would prevent unauthorized access.

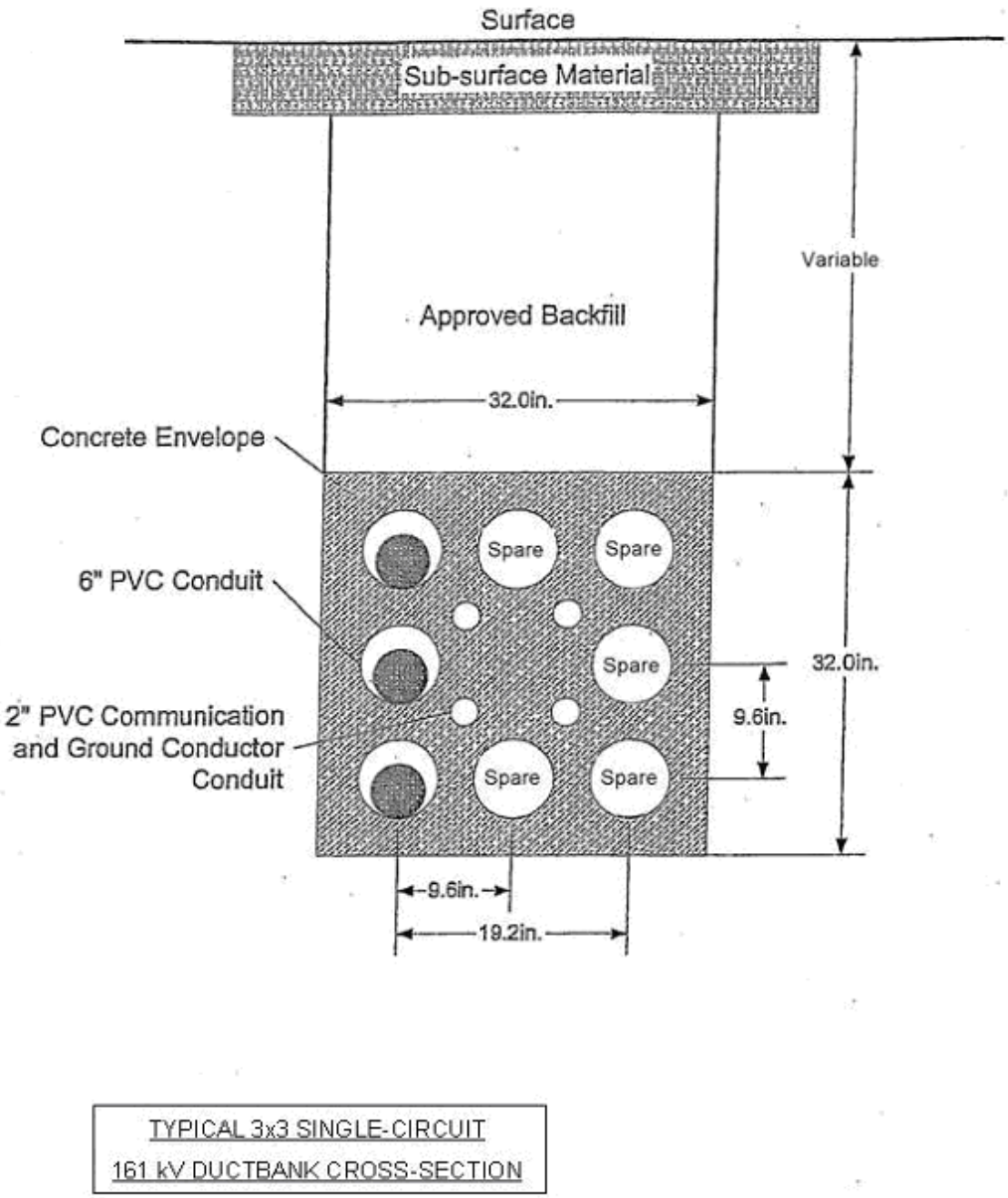
Table 3 provides a breakdown of the structure types and ROW requirements along the proposed route.

Table 3. Summary of Transmission Line Engineering Design

Description	Length (miles)	Structure Type	Average Structure Height (feet)	Average Span Length (feet)	ROW Required (feet)
Segment 1 – Karmel Ave. to Lindstrom Substation	2.2	Single-circuit, single pole horizontal line post, wood, distribution underbuild	75	260	Existing ROW
Segment 2 - Lindstrom substation to U.S. Highway 8	0.8	Single-circuit, single pole horizontal line post, steel, distribution underbuild	85-90	185-290	Existing ROW and new easements where necessary in Lindstrom
Segment 2 - U.S. Highway 8 to Shafer Tap	2	Single-circuit, single pole horizontal line post, steel, distribution underbuild (wood H-frames across large wetland complexes)	80 (single steel)	370 (single steel)	Existing ROW
			70 (H-frame)	600 (H-frame)	
Segment 3 – Shafer Tap to Lawrence Creek Substation	6.3	Single-circuit, single pole horizontal line post, wood, distribution underbuild	70	280	Existing and new 50-foot ROW
Segment 4 - Lawrence Creek Substation to east of CSAH 20	1.4	Single-circuit, single pole horizontal line post, wood, distribution underbuild	70	245	Existing and new 50-foot ROW
Segment 5 - CSAH 20 to TH 95	0.4	Underground	N/A	N/A	Existing 50-ft ROW
Segment 5 - TH 95 to St. Croix River	0.25	Single-circuit, H-frame, wood	80	500	Existing 50-ft ROW
Segment 5 - St. Croix River Crossing	0.05	Single-circuit, H-frame, wood	70	>600	Existing ROW

The Route Permit Application has several figures representing the types of structures described above. The unique structure for the underground segment is represented below in Figure 1.

Figure 1. Typical 3 x 3 Single-circuit 161 kV Duct bank Cross-section



3.4 Transmission ROW Acquisition, Construction, Restoration, and Maintenance

If the Project is approved, landowners would be provided a copy of the route permit and information on how the ROW acquisition process and Project would proceed. Xcel Energy Land Rights Agents would work with the landowners at an early stage to answer questions about the Project regarding surveys and soil investigations prior to construction. As the design of the line is further developed, contacts with the owners of affected properties would continue and Xcel Energy would begin the negotiation and acquisition phase to obtain any additional land or easement rights for the facility. Property owners would be advised as to the construction schedules, and consulted with to determine any necessary access paths to the construction sites and to identify any vegetation clearing required for the Project.

The Project would require soil analysis at several points along the route to assist with the design of the foundations and underground portions of the transmission line. Xcel Energy would inform the landowners at the initial survey consultation that soil borings may occur. An independent geotechnical testing company would take and analyze these borings. Survey crews also work with local utilities to identify underground utilities along the route. This minimizes conflicts or impacts to existing utilities along the route.

Where possible, staging and lay down areas would be located within the ROW and limited to previously disturbed or developed areas. When additional property is temporarily required for construction, temporary limited easements (TLE) may be obtained from landowners for the duration of construction. TLEs would be limited to special construction access needs or additional staging or lay down areas required outside of the proposed transmission line ROW. Typically, a previously disturbed or developed area with sufficient space to lay down material and pre-assemble structure components or hardware is used. In some cases, existing substation sites are used if there is adequate space.

Overhead Transmission Line Construction

Construction would begin after required approvals are obtained, easement acquisition is completed and necessary soil investigations have occurred. A detailed construction schedule would be developed based upon availability of crews, outage restrictions for lines that may be affected, weather conditions and any restrictions placed on certain areas for minimizing impacts from construction (such as permit conditions for sensitive environmental features). In general, the impacts of electric transmission structures are temporary and are limited to the areas directly around the structure location. Impacts are associated with large construction vehicles operating in and accessing the construction site.

The ROW would be cleared of the amount of vegetation necessary to construct, operate and maintain the proposed transmission line. It is standard practice to remove any vegetation that would be a danger to the line at a mature height, or where roots might interfere with operation in the area of the buried segment. Also, any vegetation that is in the way of construction equipment may have to be removed. Wood from the clearing operation would be offered to the landowner

or removed from the site. Brush would be chipped and disposed of on the ROW, except in residential or other developed areas.

Wood pole structures would be directly imbedded in the ground. These structures would be erected by auguring or excavating a hole typically 10 to 15 feet deep and 3 to 4 feet in diameter for each pole. The structures would then be set and the holes backfilled with excavated material, crushed rock or concrete, depending on the site conditions and structure requirements. Any excess soil may be offered to the landowner or removed from the site. In poor load-bearing soil conditions, a galvanized steel culvert is sometimes installed, with the pole set inside.

Steel pole structures would require a hole dug 15 to 25 feet deep and 4 to 8 feet in diameter for each pole location. Any excess soil would be removed from the site unless otherwise requested by the landowner. The steel structures would be supported by a drilled concrete pier foundation. Structures located in poor or wet soil conditions may require a specially engineered foundation, such as a steel caisson which may be vibrated into the ground. Structures located in areas of exposed or shallow bedrock may have drilled concrete pier foundations or shallow concrete spread footings, depending upon the quality and hardness of the rock found from the soils investigation.

Poles would be delivered to either the staked location or a Project storage yard. If the poles are delivered to the location where they would be installed, they would be placed on the ROW out of the clear zone of any adjacent roadways or designated pathways. Insulators and other hardware would be attached while the pole is on the ground. The pole would then be lifted, placed and secured on the foundation by a crane.

Once the structures have been erected, shield wire and conductors would be installed from stringing setup areas usually established every two miles within the ROW along the Project area. Conductor stringing operations would also require brief access to each structure to secure the conductor wire to the insulators and to install shield wire clamps once final sag is established. Temporary guard or clearance poles would be installed as needed over existing distribution or communication lines, streets, roads, highways, railways or other obstructions after any necessary notifications are made and permits obtained. This ensures that conductors would not obstruct traffic or contact existing energized conductors or other cables.

Transmission Line River Crossing Construction

Limited grading may be necessary near the crossing of the St. Croix River, where it may be necessary to create a level area for construction access and activities at the locations of the poles, including use of drilling equipment, cranes and bucket trucks. Approximately 0.1 acres of level land is necessary for this purpose, and Xcel Energy's preferred methodology is to locate it within the easement so that tree removal would be confined to those that would be removed as part of routine maintenance. To the extent practicable, existing structures and wire would be used to install the new facilities.

For construction of the river crossing, stringing ropes would be fastened to the old conductor. Wire stringing equipment would be set up on both sides of the river. The old conductor would then be pulled across the river in one direction. At the stringing setup site, the new wire would be fastened to the ropes and pulled back across the river to the equipment setup on the other side. The ropes and wire are pulled, while under tension, in order to minimize sag where the new wire could be damaged if scraped by hitting the ground or rocks. No construction activities would occur within the river itself.

Underground Transmission Line Construction

Xcel Energy is proposing to place a portion of this Project in the Taylors Falls/St. Croix Falls area underground, using trench construction. This would include digging a trench, constructing a duct bank and then backfilling the duct bank. The transmission line cable would then be pulled through the ductwork.

Trenching and duct installation would follow commonly accepted practices. The route would be surveyed, the trench location established and other buried utilities in the area would be marked. Before trenching begins, any existing pavement would be saw cut and removed above the proposed location of the duct bank and the trench excavated with a backhoe. Individual 6-inch PVC ducts and 2-inch ducts for communication cable and ground continuity conductors are placed in spacers in the trench, concrete forms are set, and a concrete envelope is poured around the ducts for mechanical protection and to provide good heat transfer. Clean fill is used to fill the trench around and above the duct bank, and either a steel plate or concrete cap is placed over the duct bank to provide protection to shallow duct banks before restoring the trenched area. Fluidized thermal backfill may be used where the thermal characteristics of the soil are inadequate, but is not expected to be necessary for this project. In unpaved areas, steel plates or a concrete cap are placed over a shallow duct bank before replacing the topsoil. The steel plates or concrete cap provide protection from accidental contact during excavating activities by others. A duct bank installed deeper than 30 inches generally would not have a protective steel plate or concrete cap. In paved areas, a sub-base is used under the restored pavement.

Underground cable near the transition structures would be direct buried in thermal soil fill and protected by a steel plate or concrete cap. Direct burial allows cable to transition from the duct bank to being ‘racked’ in a vertical configuration on the transition structures. Direct burial also allows ‘S’ curve of cable to be installed to provide extra length of cable for replacing a failed or damaged cable terminator in the future.

A typical progression rate for underground construction would be a few days for each 200-foot section of trench. About 500 to 700 feet of trench is open at one time. Steel plates are typically placed over open sections of trench when crews are not at that location.

Underground vaults (manholes) are located where the underground cable requires splicing. Vault installation requires a larger excavation, a few feet larger than the vault itself. Vaults of this size are often provided in two or even three pieces. Once the vaults are placed and ducts run into them, the area is backfilled (and paved if in a street). Duct bank and manhole installation,

and pavement restoration are often completed well before cable is installed. Cable installation itself does not require further excavation, except at direct burial locations near the transition structures at the end of the duct banks. Access to the end of the duct bank is required to pull the cable into the duct bank and route the cable to the transition structures.

The finished duct bank would be approximately three feet wide, with excavation 5 to 6 feet wide at the bottom to provide space for installation of ducts, spacers and concrete forms, and wider at the top to provide side slope stability, which may vary somewhat according to local conditions (e.g. the presence of rock or boulders). Once the duct bank and vaults are in place, backfilled and the surface restored, the cable would be pulled from each transition pole to the vault or vice versa depending on the contractor's preference. Areas near each transition pole, and around the manhole, would be blocked from traffic to allow equipment placement and provide a safe working area.

The underground cable in lengths of 1,500 to 2,000 feet would be provided on individual reels and set up at one transition pole or vault location. A winch at the other location pulls the cables one at a time through the individual ducts. A crane would be used to lift the cables and cable terminations into position on the transition structures. Temporary scaffolding would be built at the transition structures for workers to install the cable terminations onto the cables.

Restoration Procedures

During construction, crews would attempt to limit ground disturbance wherever possible. Upon completion of construction activities, landowners would be contacted to determine if any additional restoration due to construction damage is necessary. Disturbed areas would be restored to their original condition to the maximum extent practicable and as negotiated with the landowner. Post-construction reclamation activities include removing and disposing of debris, dismantling all temporary facilities (including staging and lay down areas), alleviating compaction, employing appropriate erosion control measures and reseeding areas disturbed by construction activities with vegetation similar to that which was removed.
For the segment of line proposed to be buried, the ground above the trench would be backfilled with clean fill (or fluidized thermal backfill if soil conditions require it) and capped with soil. Any excess excavated soils would be hauled away or stored onsite. If any street pavement is removed as part of burying the transmission line, the trench would be backfilled with thermal backfill and the road would be recapped at-grade with the surrounding pavement.

Once construction is completed, each landowner is contacted by the ROW agent to determine if any damage has occurred as a result of the construction project. If damage has occurred to crops, fences, or the property, the Applicants would compensate the landowner for the damages caused. In some cases, an outside contractor may be contacted to restore the damaged property as nearly as possible to its original condition.

Maintenance Procedures

Periodic ROW access is required to perform inspections and maintenance or to repair any damage. Regular maintenance and inspections would be performed during the life of the facility to ensure its continued integrity. Periodic inspections would be performed by ground personnel on foot, snowmobile, ATV, by pick-up truck or by aerial means. Inspections would be limited to the ROW and areas where obstructions or terrain may require off-ROW access. If problems are found during inspection, repairs would be performed.

The ROW would be managed to remove vegetation that interferes with the operation and maintenance of the line. ROW clearing practices include a combination of mechanical and hand clearing, along with herbicide application, where allowed, to remove or control vegetation. Current Xcel Energy practice provides for the inspection of transmission lines of less than 230 kV every five years.

Annual operating and maintenance costs associated with 69 kV, 115 kV and 161 kV transmission voltages across Xcel Energy's upper Midwest system have averaged on the order of $500 per mile for transmission ROW over the last five years. Actual line specific maintenance costs would depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types and materials and the age of the line. The majority of the Project would be routed through agricultural and residential land with relatively little tree maintenance required. Vegetation management would also be required in the underground portion of the line. Since the structures would be new, there would be minimal maintenance required for several years. The principal operating and maintenance cost would be inspections usually done by air monthly and on the ground once a year. Steel poles and concrete foundations would be expected to require minimal maintenance. Wood poles would require inspection at approximately 10-year intervals to ensure structural integrity.

Maintenance for underground transmission lines is minimal. Maintenance is generally limited to removal of non-compliant vegetation above the duct bank and prevention of construction of structures or grade changes by landowners over the duct bank. The only potential maintenance on the underground transmission line would be caused by accidental dig-ins. Duct bank repair and damaged cable replacement would then be required. The only other maintenance would be repair of the cable terminators on the transition structures. Failure of cable terminators generally occur immediately after the cable is energized, so they would be replaced during construction and most likely would not be a regular maintenance item. Vandalism of terminators would require replacement or repair, but such vandalism has been rare.

3.5 Substations

Substations interconnect transmission lines and transformers and change voltages from one transmission line to another, or to a sub-transmission level. Transmission lines are typically connected to the substation bus which in turn connects the line to other components in the substation.

Since the Chisago Transmission Project seeks to change the voltage of an existing line to a higher voltage, this change necessitates modifications to a number of substations that are integral to the operation of the local electrical grid. The following substation changes have been proposed by the company.

The Chisago County Substation is located in Section 1, Township 34N, Range 21W. This substation is owned and operated by Xcel Energy.

Modifications to this substation would be required to accommodate the upgrade of the 69 kV section of the existing double-circuit 115/69 kV transmission line to 115 kV. This work includes the addition of one 115 kV circuit breaker and associated foundations and structural steel within the existing graded and fenced area. This work would not require expansion of the existing substation.

The Lindstrom Substation is located west of the city of Lindstrom in Section 33, Township 34N, Range 20W. This substation is owned and operated by Xcel Energy.

Modifications to this substation would be required to accommodate the single-circuit 115 kV transmission line. The existing graded area would be expanded approximately 50 feet to the east, to accommodate the new equipment. At the northeast corner, an area approximately 100 feet east to west and 23 feet north to south would also be expanded and graded. These expansions represent approximately 14,000 ft^2 in additional graded area to the existing site. Steel structures and associated concrete pier foundations would be installed to support high-voltage switches and buswork. Concrete pad foundations would be installed to support high-voltage circuit breakers and transformers. The existing 69/12.5 kV power transformers would be replaced with two new 115/12.5 kV power transformers. One new 115 kV circuit breaker would be installed.

The Shafer Substation is located in Section 35, Township 34N, Range 20W. This substation is owned by Great River Energy (GRE) and operated by Xcel Energy.

Modifications to this substation would be required to accommodate the single-circuit 115 kV transmission line. The existing 69/12.5 kV power transformer would be replaced with a new 115/12.5 kV power transformer. A new 115 kV three-way switch mounted on a transmission line structure would be installed along the transmission line route to facilitate the new 115 kV connection to the substation. This work would not require expansion of the existing substation.

The new Lawrence Creek Substation is proposed to be located north of County Road 82 in Section 25, Township 34N, Range 19W. Approximately 8.0 acres of property would need to be acquired to accommodate the substation construction for this Project.

The initial fenced area would be approximately 475 x 206 feet, or approximately 2.2 acres. The ultimate size of the fenced area would be 475 x 375 feet, or approximately 4.1 acres. Concrete pier foundations would be installed to support numerous steel w-flange (I-beam) columns and platforms positioned throughout the substation for the placement of high-voltage bus-work and

switches. Concrete pad foundations would be installed for supporting high-voltage circuit breakers and transformers. A steel control house would also be erected within the fenced area that would enclose protective relay and control equipment. The main pieces of electrical equipment are included in the following list, however, the substation would be designed and constructed in a manner that would allow the future installation of additional circuit breakers and transformers.

- (4) 115kV Circuit Breakers
- 69 kV Circuit Breaker
- 115/161 kV Power Transformer
- 115/69 kV Power Transformer
- 115/12.5 kV Power Transformer
- Control House
- (1) 12.5 kV Switchgear Enclosure
- High-voltage buswork, switches and associated steel supporting structures

3.6 Substation Property Acquisition, Construction, Restoration and Maintenance

Xcel Energy would need to purchase land for the new Lawrence Creek Substation and for the expansion of the east side of the Lindstrom Substation. All of the modification required to the remaining existing substations would be constructed on the existing property. An eight acre parcel would be acquired for the Lawrence Creek substation. Approximately 0.3 acres would be acquired in order to expand the Lindstrom substation to the east.

As the routing process proceeds, contacts with the landowners of affected properties would occur. After the Route Permit is obtained, the negotiation and acquisition phase would begin to obtain the necessary property for these two substations. Whenever possible, Xcel Energy would seek to obtain new ROW through voluntary purchase.

Staging areas for construction would be located within Xcel Energy's substation property boundaries. If additional property is temporarily required for construction, TLEs may be obtained from landowners for the duration of construction. TLEs would be limited to special construction access needs or additional staging areas required outside of the Project area.

Substation Construction Procedures

This Project would include substation work at various locations. There would be minor work at the Chisago County Substation to tie-in the transmission line. This work includes the addition of two 115 kV circuit breakers and associated foundations and structural steel. Expansion of the existing graded and fenced area would not be required.

The construction for new and expanded substations includes site preparation work, which involves grading and leveling the site with heavy equipment. All vegetation would be cleared from the substation footprint area, the substation driveway area, as well as a buffer of 15 feet outside the substation fence. It is standard practice to remove all vegetation from within the substation. Vegetation on the property outside of the substation footprint and driveway is normally left undisturbed, except where it must be removed to allow for transmission line access to the substation.

Once the grading activities have been completed, the site perimeter would be enclosed with a security fence. This would be a standard chain link fence that is 7 feet in height and topped with a 1-foot extension having three strands of barbed wire. Concrete pier foundations would be installed to support numerous steel w-flange (I-beam) columns and platforms positioned throughout the substation for the placement of high-voltage bus-work and switches. Concrete pad foundations would be installed for supporting high-voltage circuit breakers and transformers. In the case of the new Lawrence Creek Substation, a steel control house would also be erected within the fenced area to enclose protective relay and control equipment.

Restoration Procedures

Upon completion of construction activities, Xcel Energy would restore the remainder of the site. Post-construction reclamation activities include the removing and disposing of debris, dismantling all temporary facilities (including staging areas), employing appropriate erosion control measures and reseeding areas disturbed by construction activities with vegetation similar to that which was removed. Where appropriate, Xcel Energy would incorporate methods to screen the final site.

Maintenance Procedures

Xcel Energy would perform periodic inspections, maintain equipment and make repairs over the life of the substation. Xcel Energy would also conduct routine maintenance as required to remove undesired vegetation that may interfere with the safe and reliable operation of the substation

4.0 Alternatives to the Proposed Project

In addition to need, the CN process reviews possible alternatives to the proposed project that may be able to fill that need. A general description of these alternatives is required per Minn. R. 4410.7035, Subp. 1 (B). The requirements of this rule include an investigation into the feasibility of the following alternatives:

- The no-build alternative,
- Demand side management,
- Purchased power,
- Facilities of a different size or using a different energy source than the source proposed by the applicant,
- Generation rather than transmission,
- Renewable energy sources

The magnitude of any alternative is based on the assumption that approximately 36 to 87 MW of additional generation would be required to meet the increasing demand for electricity in the project area. This is based on information that was submitted by Xcel Energy in the Certificate of Need Application, which states:

> *Three or four 25 to 40 MW generating units would be required initially to reliably meet the projected peak power demand through 2015 without transmission improvements. Two or three would have to operate to provide protection from the possibility of transmission failure, and a spare would have to be in place to accommodate planned or forced outages of one of the units.*

The following section discusses the feasibility and availability of potential alternatives to the transmission line which could eliminate the need for the proposed project.

4.1 No Build Alternative

Under the no build alternative none of the existing structures would be replaced and the transmission line would continue to be operated at 69 kV. None of the proposed substations improvements would be completed.

Under this alternative, peak-demand periods could result in localized voltage collapse or damage to equipment. The company would need several hours to restore electric service to customers in the area under such a scenario, and once service was restored the company may need to institute rotating blackouts to insure that voltage would not collapse again. Furthermore, it is likely that there would be a negative effect on the local economy due to the unreliable electrical service in the area.

This is not a feasible alternative. This alternative does not address the voltage support issues that are being experienced in the area. Under this alternative it is likely that there would be an

unacceptable negative effect on the local economy due to the unreliable electrical service in the area.

4.2 Conservation alternative

This alternative would seek to address the need of 36-87 MW with Demand Side Management. The alternative would use a slate of energy conservation measures that would ultimately reduce load in the area to a level allowing the current system to operate in a reliable manner. This conservation effort would most likely be phased in, and would be above and beyond the companies' current efforts. In addition, any load growth occurring in the area would also need to be met through aggressive conservation effort.

Xcel Energy has obtained significant energy savings from various conservations programs, including the Conservation Improvement Program (CIP) as required by Minnesota Statutes 216B.241. While the company anticipates futures savings from the continuation of these efforts, conservation alone will not be sufficient to address the significant reliability issue that exists in the area. In comments on the Certificate of Need Application, Department analyst Dr. Steve Rakow states the following:

> *…the historical load already exceeds the reliable supply capacity. Therefore DSM (Demand Side Management) would have to reduce actual load levels rather than reducing the rate of growth in the demand for electricity, particularly at peak periods … Even if it were possible to reduce load the ability of DSM to achieve the locational precision implied by the need is doubtful.*

This is not a feasible alternative given that an unrealistic amount of conservation would have to be achieved in the project area to meet the needs that would otherwise be met by the proposed project.

4.3 Purchased Power

Another alternative generally reviewed in a Certificate of Need case is whether the Applicants could purchase power to meet the increased load growth in the area. Typically, this would be more relevant in a power plant application. In this transmission application, purchased power would not solve any system inadequacies in the area. Power, produced or purchased, would have to be transferred and delivered along an arguably inadequate transmission system.

This is not a feasible alternative as there would still be voltage support issues in the area and it is likely that Xcel Energy would have to upgrade the transmission line in order to deliver purchased power to the area.

4.4 Facilities of a Different Size or Using a Different Energy Source

Two alternative system configurations were evaluated in detail by the Applicants and are considered in Chapter 3 of the Certificate of Need applications. The first alternative is the "69 kV rebuild alternative" that would require replacing the existing 69 kV line with a new 69 kV line that provides higher capacity and utilizes larger conductors. The second alternative is the "69 kV reconfiguration alternative" where portions of the existing 69 kV system serving Minnesota and Wisconsin are separated. On the Minnesota side, transformers replacements and capacitor additions would be made at existing substations. There are several transmissions alterations and additions on the Wisconsin side.

Xcel Energy considers each of these alternatives to be feasible. They describe an extensive comparative analysis in Chapter 4 of the CN application.

> *Applicants conclude that the 115/161 kV proposal represents the best solution to the deficiencies identified in the 69 kV local load serving system of the northeastern fringe of the metropolitan area. While all three alternatives meet the systems anticipated requirements through at east 2015, its higher voltage provides 50% greater load serving capability. The proposal also addresses transmission system deficiencies in northwestern Wisconsin with the fewest additional elements.*

In the Applicants' judgment, the proposal is also preferable in environmental, land use and aesthetic effects "by utilizing the existing 69 kV centerline and by placing the line underground in the National Scenic Riverway."

4.5 Generation Alternatives

Any generation alternative to the transmission line would be required to generate approximately 36 to 87 MW of capacity for delivery to the area. This distributed generation (DG) would have to be segmented into three or four 25 to 40 MW generating units strategically located throughout the transmission delivery area. While there could be a phased approach to the generation alternative, one that would meet the load growth as it occurred, for the purposes of this analysis it will be assumed that all capacity would be installed at once.

While there are multiple sources of generation that would be capable of meeting the capacity need that has been identified in these areas, the most likely are:

- Natural gas combustion turbine generator
- Diesel generator or series of Diesel Generators
- Large Wind Energy Conversion System

Table 4, from the U.S. Department of Energy, provides some specifics regarding the generation alternatives that have been selected for review in this matter. As the table shows, the capital

investment would be very large. Appendix B of the CN application shows the revenue requirements for a DG alternative to be over $100 million more than the estimated cost of the proposed project. Each alternative other than wind also has air emissions impacts, including nitrous oxide and carbon dioxide outputs.

Table 4. Summary of DG Cost and Performance Parameters (Excerpt)

Technology	Size Range (kW)	Installed Cost ($/kW)[b]	Heat Rate (BTU/ kWh_e)	Approx. Efficiency (%)	Variable O&M ($/kWh)	Emissions[a] (lb/kWh)	
						NO_x	CO_2
Diesel Engine	1-10,000	350-800	7,800	45	0.025	0.017	1.7
Natural Gas Engine	1-5,000	450-1,100	9,700	35	0.025	0.0059	0.97
Combustion Turbine	300-10,000	550-1,700	11,000	31	0.024	0.0012	1.15
Wind Turbine	0.2-5,000	1,000-3,000	--	N/A	0.01	0	0

[a] Nationwide utility averages for emissions from generating plants are 0.005 lb/kWh of NQ and 1.2 lb/kWh of CO_2.

[b] The high end of the range indicates costs with NQ controls for the most severe emissions limits internal combustion technologies only.

Natural Gas Generator

Natural gas fired generation, in the form of either a combustion turbine generator or a reciprocating engine, is a questionable alternative. The Viking Pipeline crosses the area, but it is uncertain whether there is sufficient capacity of natural gas available from this source.

Technically, three or four 25-40 MW gas generators could be placed strategically throughout the system to support local demand. This solution could provide the same level of local reliability as the proposed project. However, this produced energy could not be used outside the immediate service area as the existing 69 kV transmission system may be inadequate to transmit power out to the grid. According to Xcel Energy estimates, 25 MW gas plants would could about $30-35 million each, and 40 MW turbines would each cost approximately $40-45 million.

This generation alternative is not feasible. This solution would cost considerably more than the proposed transmission system; and the existing transmission system may continue to suffer overall reliability problems.

Diesel Generator

Diesel fired generators are generally utilized on a standby basis, and fired when conditions, such as a contingency situation when a line or transformer is taken out of service, require operation of the generator. While diesel generators are not generally operated continually, there are a number of models available that would be capable of higher annual hours of operation.

However, this alternative is not feasible since the ongoing operating cost of a diesel generator would be significant, both monetarily and environmentally. A diesel generation alternative would result in significant emissions of NO_x and CO_2. Furthermore, a diesel alternative would require that the fuel be delivered by truck. The costs of this alternative would be extremely high; fuel costs alone could result in energy that was more than $0.11/kWh, assuming a relatively low diesel fuel price of $2.00 per gallon. In addition, the capital cost of such an alternative would be prohibitive.

Renewable Generation Alternative

According to Commerce Department resource mapping, Chisago County is a moderate to low wind resource area for wind-power development. A renewable generation alternative to supply, for example, 75 MW of power would require the installation of between 15 and 30 turbines, using standard installations in use and planned in Minnesota today. However, this would only reflect a nameplate capacity of 75 MW and may not be capable of providing the power needed during the critical periods this project is intended to address.

If the wind facility were required to produce a minimum of 75 MW of capacity throughout the year it would have to be sized using the lowest monthly accreditation. Accreditation refers to the level of capacity that a wind plant will be able to provide at a particular point in time, usually during peak demand periods. In the Midwest, capacity accreditation is lowest during the summer months when the area experiences its lowest wind resource.

The Midcontinent Area Power Pool (MAPP) monthly accreditation for variable generation sources was discussed in the *2004 Xcel Energy and the Minnesota Department of Commerce Wind Integration Study – Final Report*[1]. In that study the lowest monthly accreditation was 16.6 percent and associated with the month of July. If the wind facility were required to produce a minimum of 75 MW of capacity throughout the year it would have to be sized using the lowest monthly accreditation. This example would require an approximately 450 MW wind farm, with between 180 and 300 wind turbines, an unrealistic approach to meet the stated need of the proposed project.

[1] Source: Xcel Energy and Minnesota Department of Commerce Wind Integration Study – Final Report. September 28, 2004. http://www.state.mn.us/mn/externalDocs/Commerce/Wind_Integration_Study_092804022437_WindIntegrationStudyFinal.pdf.

It is unlikely that a wind generation alternative would be a feasible alternative to the proposed project. The development of wind turbines has significant transmission implications, which may only serve to further stress the existing transmission system in the area. Additionally, there is a real risk that any wind generation alternative would not be capable of generating energy during critical contingency periods, especially during high demand periods in the summer months.

5.0 Working Group Alternatives to the Proposed Project

DOC Energy Facility Permitting Staff convened a Working Group of interested local governments and citizens to garner input concerning local issues to address in the EA. EFP met with this group three times, and the group submitted a report and recommendations to the Department.

In addition to offering input on impacts of route alternatives, the Working Group also came up with three system alternatives. As with the alternatives discussed in Chapter 4 above, these alternatives are considered as intended to be employed in lieu of the transmission project proposed by the Applicants. The recommendations can be reviewed in the report in Appendix C.

5.1 Working Group Alternative 2

This alternative routes a line from Rock Creek Substation in Minnesota to Grantsburg, Wisconsin, then (depending on engineering value decisions) either to the Apple River Substation near Amery, or to the Washco Substation near Shell Lake, Wisconsin, as discussed in the working group report. (See Map 5 in Appendix A.)

Xcel Energy provided information on this proposal in its response to DOC Information Request #13. The "Working Group Alternative 2" has been previously analyzed and is referred to as option RC in Appendix B of the Certificate of Need Application. Appendix B, the Chisago Engineering Analysis, indicates on pages 4, 16 and 21 that the Rock Creek-Washco 161 kV line (Option RC) is not effective in addressing the local load serving issues in Chisago area. The 69 kV transmission system between Arden Hills, St Croix Falls and Apple River substations does not have adequate capacity to serve the customer demand during contingency conditions. Therefore, these lines must be upgraded to provide adequate capacity to the distribution substations served from these lines. Selection of an alternative route that does not rebuild these lines does not address the issue that the lines serving these communities have inadequate capacity during contingencies and must be upgraded.

Connecting the Grantsburg Substation to the Rock Creek Substation would require approximately 10 to 11 miles of overhead transmission line, approximately 3.5 miles of which would be in Minnesota. The line would parallel an existing 230 kV transmission line corridor for the first mile and then would parallel Minnesota Trunk Highway (TH) 70 for approximately three miles in Minnesota and cross the St. Croix River at the highway bridge. There is an existing 69 kV line that is buried beneath the St. Croix River at this point. While the bridge has been designed to accommodate transmission line cable, there is not adequate information at this time to determine if a 115 kV line could be carried on the bridge or that the MN DOT would approve such a line. The decision was made during the siting process of the current 69 kV line that boring the line under the river was preferable to placing the line on the bridge.

The setting along this stretch of TH 70 is rural residential, with occupied residences concentrated in the eastern portion of the Minnesota segment, at the Maple Avenue and Nature Avenue

intersections. The westernmost 2.5 miles of this route pass through generally undeveloped woodlands and wetlands.

The two sub-alternatives in Wisconsin, connecting Rock Creek Substation to either Apple River Substation near Amery or to the Washco Substation near Shell Lake, would each require approximately 40 miles of new overhead transmission corridor. In order to construct these lines, the utilities would need to file for Certificates of Public Convenience and Necessity (CPCN) from the Wisconsin Public Service Commission.

5.2 Working Group Alternative 3

This alternative routes a line from the King Plant Substation at Bayport, Minnesota, to the Pine Lake Substation near Baldwin, Wisconsin, and the Red Rock Substation in Newport, Minnesota, to the Crystal Cave Substation near Martel, Wisconsin, and from Pine Lake Substation to the Apple River Substation near Amery, WI (the new Stillwater bridge would be an alternative route segment for the King crossing). (See Map 6 in Appendix A.)

As discussed in Xcel Energy's response to DOC Information Request #14, an option similar to "Working Group Alternative 3" has been previously analyzed and is referred to as option KP in Appendix B to the Application. Appendix B, the Chisago Engineering Analysis, indicates on pages 4, 16 and 21 that the King-Pine Lake-T Corners 115 kV line conversion to 161 kV with the second Pine Lake-Apple River 161 kV line (Option KP) is not effective in addressing the local load serving issues in the Chisago area. The 69 kV transmission system between Arden Hills, St Croix Falls and Apple River substations does not have adequate capacity to serve the customer demand during contingency conditions. Therefore, these lines must be upgraded to provide adequate capacity to the distribution substations served from these lines. Selection of an alternative route that does not rebuild these lines does not address the issue that the lines serving these communities have inadequate capacity during contingencies and must be upgraded. Upgrade of either King-Pine Lake river crossing or Red Rock-Crystal Cave river crossing does not provide any 69 kV load-serving benefits to Chisago area.

Red Rock to Crystal Cave

Upgrading the existing 115 kV transmission line between Red Rock Substation and Crystal Cave Substation would involve completely rebuilding approximately 33 miles of line, including new structures and higher capacity conductors. In Minnesota, the route would follow the existing 115 kV line east for approximately 12 miles through the cities of Newport, Woodbury, and Afton, to the existing St. Croix River crossing.

The environmental setting is primarily suburban, although the areas through the city of Afton are rural residential with adjacent agricultural fields, and the route is adjacent to an orchard in Woodbury. The easternmost segment near the St. Croix River is wooded with scattered residences. The route is within a half mile of Afton State Park.

The Minnesota portion of the route is within 300 feet of approximately 39 residences (including 11 that are within 100 feet the corridor).

The cities of Woodbury and Afton are experiencing high levels of development. The route likely would not conflict with existing or planned land use because it is a rebuild of an existing line. Construction of the line could result in temporary impacts to the roads crossed by the route.

This portion of the alternative crosses 24 NWI wetlands. Because the route is a rebuild of an existing transmission line, new impacts to wetlands are not anticipated, although temporary impacts to at least one wetland would be necessary during construction if they cannot be spanned. The route crosses approximately 5.9 miles of agricultural land. Because the route is a rebuild of an existing transmission line, impacts to prime farmland would be minimized, and impacts to the agricultural economy are not anticipated.

In June 2007, HDR requested a list of all inventoried properties within one mile of the alternative transmission line route. Coordination with the state archaeologist and MN SHPO could still be required for this alternative route segment. It is possible that a cultural resources survey would be necessary in order to ensure that the structures effectively span any archaeological sites that have not been documented.

The approximately 21 miles of upgrades that would occur in Wisconsin would require a revised CPCN permit from the Wisconsin Public Service Commission.

King Plant Substation to Pine River Substation

Upgrading the existing 115 kV transmission line to 161 kV between King Plant Substation and Pine River Substation would involve completely rebuilding approximately 21.5 miles of line. In Minnesota, there are two alternatives: following the existing 115 kV line east for approximately 0.4 miles in the City of Oak Park Heights to the existing St. Croix River crossing; or following the proposed new St. Croix River Crossing Bridge along new transmission ROW for approximately 0.25 miles.

The environmental setting for both alternatives consists of industrial land uses (the King Plant Substation), highways (both existing and planned), wooded areas and the St. Croix River. There are no residences within 300 feet of either of the alternatives in Minnesota.

Upgrading the existing 115 kV line to 161 kV may require additional ROW and tree clearing, depending upon an analysis of span, blowout, conductor characteristics, tension and sag. Regardless, additional ROW and tree clearing would likely be minimal. Any tree clearing is not expected to affect the viewshed from the river because it would likely not be a noticeable change from the existing cleared corridor.

Constructing the 161 kV along new transmission ROW to follow the proposed new St. Croix River Crossing Bridge would not be likely to result in tree clearing in addition to that necessary for the highway construction.

This portion of the alternative crosses one NWI wetland associated with the St. Croix River in Minnesota. Because the alternatives are either a rebuild of an existing transmission line or follow the proposed highway corridor, new impacts to wetlands are not anticipated. No impacts to agricultural land will occur in Minnesota from construction of this segment.

In June 2007 HDR requested a list of all inventoried properties within one mile of the alternative transmission line route. Coordination with the state archaeologist and MN SHPO could still be required for this alternative route segment. It is possible that a cultural resources survey would be necessary in order to ensure that the structures effectively span any archaeological sites that have not been documented.

The approximately 21 miles of upgrades that would occur in Wisconsin would require a revised CPCN permit from the Wisconsin Public Service Commission.

Pine Lake to Apple River

The new 161 kV line connecting Pine Lake Substation to the Apple River Substation would require approximately 24 miles of new overhead transmission corridor. A revised CPCN permit from the Wisconsin Public Service Commission would be required for these new routes in Wisconsin.

5.3 Working Group Alternative 4

This option is a series of upgrades to bolster the distribution system in the area, particularly the 69kV facilities. There were 8 alternatives proposed using four variations of basic configurations in Phase I, and a 115kV Base Plan was proposed in Phase II. This option is nearly synonymous with the Hugo Area Long-Range Electric Delivery System Study series of local upgrades.

A screening analysis of the Hugo option is effectively the Base Case condition analyzed in the Chisago Engineering Analysis in Appendix B to the CN application. All upgrades recommended in the Hugo Area Long-Range study, except one, were already in service in the base case. The only upgrade not in the base cases is the new 69/34.5 kV substation near Taylors Falls. The addition of the Taylors Falls 69/34.5 kV substation provides no benefits to the Chisago local area, because the customer demand is only moved from St Croix Falls Substation across the river to Taylors Falls. The demand still must be served by the 69 kV system out of Arden Hills and Apple River.

While the Hugo Area plan has reduced loading on Chisago area 69 kV load serving system, these benefits have already been captured in the base case assumptions. As the Hugo Area plan has been implemented and Chisago area has contingent load serving limitation with this plan in place, the Hugo Area plan cannot be considered an alternative. See Appendix B2 of Chisago Engineering Analysis for requested screening results for the Base Case that is the same as "Working Group Alternative 4."

As described above, the only element of the Hugo study not in place is the Lawrence Creek Substation, which was analyzed as part of the proposed project. In addition, the Hugo Study is 13 years old, and more recent studies have superseded that document.

6.0 Potential Impacts of the Proposed Route

This section describes the potential impacts on resources and mitigation measures to minimize impacts from construction, operation and maintenance of the proposed transmission line and associated substation facilities.

The construction of a transmission line involves both short and long-term impacts. An impact is a change in the status of the existing environment as a direct or indirect result of the proposed action. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and occur later or are further removed in distance, but are still reasonably foreseeable. Impacts may be negative or positive and temporary or permanent or long-lasting. Short-term impacts are generally associated with the construction phase of the Project and can include crop damage, soil compaction, and noise. Long-term impacts can exist for the life of the Project and may include land use restrictions or modifications. Measures that would be implemented to reduce minimize, or eliminate potential impacts would be taken and they are discussed under the appropriate topic and highlighted as necessary in this section.

It may be possible to mitigate potential impacts by adjusting the proposed route, selecting a different type of structure or pole, using different construction methods, or implementing any number of post-construction practices. The PUC can require route permit applicants to use specific techniques to mitigate impacts or require certain mitigation thresholds or standards to be met through permit conditions.

There are a number of potential impacts associate with HVTLs that must be taken into account on any transmission line project. Minnesota Rule 4400.3150 A through N identifies 14 factors that the PUC must consider when designating a route for a HVTL.

6.1 Description of Environmental Setting

Much of the Project area follows what was once part of the famed “Big Woods” hardwood forests in east central Minnesota. However, much of the wooded habitat has been cleared for agricultural purposes. The current day landscape is a mixture of row crops (primarily corn and soybeans), lakes, scattered woodlands, small towns and a growing number of housing developments.

The cities of Chisago, Lindstrom, Center City, Shafer and Taylors Falls are all within the Project area. The Chisago County natural environment is home to a variety of wildlife and natural resources. The St. Croix River and Sunrise River bound the Project on the east and west, providing ample recreational opportunities to the area’s residents and supporting a profitable tourism industry.

6.2 Socioeconomic

Table 5 summarizes 1990 and 2000 Census data and population estimates for 2005 for Chisago County and cities within the Project area. Much of the population and economic growth in the Project area is concentrated in the Chisago and Lindstrom area. The cities in this township serve as bedroom communities to the Minneapolis-St. Paul metropolitan area. Population in the region is expected to grow in the future, primarily as a result of in-migration.

Table 5. Social & Economic Profile

	Chisago County	Chisago City	Lindstrom	Center City	Shafer	Taylors Falls
Population						
1990 Population*	30,521	2,009	2,461	451	368	694
2000 Population*	41,101	2,622	3,015	582	343	951
Percent change 1990-2000*	**34.7**	**30.5**	**22.5**	**29**	**-6.8**	**37**
2005 population estimate***	49,417	4,258	3,923	630	794	1,051
Percent change 2000-2005	**20.2**	**62.4**	**30.1**	**8.2**	**131.5**	**10.5**
2010 population projection***	51,640	--	--	--	--	--
2000 Total minority population*	1,461	96	91	22	9	85
Urban population**	14,611	2,435	2,935	658	0	0
Rural population**	26,490	59	157	0	350	917
Median age*	34.3	37.8	38.8	39.1	31.3	34.8
Population by Age						
Population under 18 years*	12,395	657	784	143	113	283
Population 18 years and over*	28,706	1,965	2,231	439	230	668
Population 65 years and over*	4,047	550	546	69	24	132
Household						
Number of households*	14,454	1,038	1,225	194	124	369
Number of families*	11,082	685	855	148	93	248
Income						
1999 Median household income**	$52,012	$38,352	$44,980	$48,594	$41,667	$35,250
1999 Median family income**	$57,335	$51,964	$50,519	$51,875	$43,000	$39,886
Population below poverty level**	2,052	143	247	33	32	183
Percent below poverty level**	5.1	6	8	5.5	9.1	20
Housing						
Number of housing units*	15,533	1,107	1,322	214	129	386
Owner-occupied housing units*	12,587	649	1,038	182	107	282
Renter-occupied housing units*	1,867	389	187	12	17	87
Median housing value**	$133,200	$125,700	$114,100	$139,400	$84,300	$105,400
Median contract rent**	$450	$556	$443	$388	$410	$417
Average travel time to work **	31.9	27.8	31	33.9	29.8	32.1

* 2000 Census Summary File 1 Profile
** 2000 Census Summary File 3 Profile
*** Minnesota State Demographic Center

According to the 2000 Census race demographics, Chisago County is 96.7 percent white. Other minority groups in the area constitute a very small percentage of the total population. This trend is consistent throughout the cities in the Project area. Within Chisago County, approximately 5.1 percent of the population was identified as being below poverty level in the 2000 Census. With the exception of Taylors Falls, less than 10 percent of all individuals in the cities within the Project area are considered below poverty level. Taylors Falls has approximately 20 percent of its population below poverty level. There are no areas within the City that are comprised of primarily low-income housing. These individuals tend to be scattered throughout the City. Traditionally, the economy of the region has been dependent on the timber industry.

There was dramatic growth in the population at the turn of the century as a result of people migrating into the region to find employment in the timber industry. During the subsequent decades, the economy shifted to agriculture, primarily dairy operations. In recent years, there has also been significant growth in the services sector partially in response to the growth of recreation, tourism, and manufacturing and to serve the rapidly growing population. The economy in the region is diverse. The region is a destination for tourists, drawn by the abundance of outdoor recreational resources and the easy accessibility from the Minneapolis-St. Paul area. The proximity to the Twin Cities is a major factor affecting growth in the area.

As evidenced by employment data, much of the area population works outside the area. The area serves as a bedroom community to the Minneapolis-St. Paul metropolitan area.

Table 6. Workforce and Employment

	Chisago County		E. Central (7E) RDC	
Employment By Industry*				
Natural Resources and Mining	44	0.31%	402	0.86%
Construction	1,097	7.66%	2,829	6.06%
Manufacturing	2,064	14.41%	4,960	10.62%
Trade, Transportation and Utilities	2,196	15.33%	7,568	16.21%
Information	60	0.42%	581	1.24%
Financial Activities	527	3.68%	1,692	3.62%
Professional and Business Svcs.	862	6.02%	1,786	3.83%
Education and Health Services	2,998	20.93%	8,291	17.76%
Leisure and Hospitality	1,539	10.74%	4,796	10.27%
Other Services	336	2.35%	1,250	2.68%
Government	2,601	18.16%	12,537	26.85%
	14,324		46,692	
Workforce**				
Total Employment	26,265		78,658	
Unemployment Rate		4.80%		5.60%

** Source: DEED - Labor Market Information: CEW Annual Data 2006*
*** Source: DEED - Labor Market Information: LAUS Annual Average 2006*

Potential Impacts

Short-term impacts to socioeconomic resources would be relatively minor. The construction, operation and maintenance of the transmission line would not have a significant effect on agricultural operations. Xcel Energy has calculated that approximately 4.1 acres would be permanently removed from agricultural production. Project construction would not cause permanent impacts to leading industries within the Project area.

The relatively short-term nature of the Project construction and the number of workers who would be hired from outside of the Project area should result in short-term positive economic impacts in the form of increased spending on lodging, meals and other consumer goods and services. It is not anticipated that the Project would create new permanent jobs during construction, but would create temporary jobs that would provide a short-term influx of income to the area. Xcel Energy anticipates the following number of people would be working on this Project:

Table 7. Estimated Number of Workers for Construction

Type of Work	Number of Employees
Right-of-Way	1
Survey	2
Construction-Foundations	6-8
Construction-Poles	12-15
Construction-Substation	10-20
Construction – Underground duct work and manholes	4-6
Construction – Cable Pulling (underground segment)	6-10
Underground cable termination	4
Office Personnel	4

Long-term beneficial impacts to the county's tax base, as a result of the construction and operation of the transmission line, would be the incremental increase in revenue from utility property taxes which is based on the value of the Project. The availability of reliable power in the area would have a positive effect on local businesses and the quality of service provided to the general public.

If local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Chisago County would contribute to the total personal income of the region. Additional personal income would be generated for residents in the county and the state by circulation and recirculation of dollars paid out by the applicants as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies and other products and services would benefit businesses in the counties and the state. Indirect

impact may occur through the increased capability of the applicants to supply energy to commercial and industrial users, which would contribute to the economic growth of the region.

There is no indication that any minority or low-income population is concentrated in any one area of the Project, or that the transmission line would cross through an area occupied primarily by any minority group.

Property Values

One of the first concerns of many residents near existing or proposed transmission lines is how that proximity could affect the value of their property. Those concerns are addressed in this case by comparing similar transmission lines in similar communities.

The Shenehon Company of Minneapolis, a business and real estate valuation company, performed a study on property values in the Maple Grove area relative to proximity to transmission lines. Their conclusions were included in the GRE application for a permit for a 115 kV line in Plymouth and Maple Grove in Hennepin County, EQB Docket No. 03-65-TR-GRE PMG. According to the report, "it is our opinion that single source power lines do not cause a measurable and significant diminution in value to typical single-family homes in Maple Grove … homes defined as larger "family" homes exhibit a slightly larger incremental decrease in selling price. However, given the inexact nature of real estate markets in general, we cannot conclude that the entire difference is attributed to proximity to the power line, or that the difference is considered significant."

In the Final Environmental Impact Statement on the Arrowhead-Weston Electric Transmission Line Project, the Wisconsin Public Service Commission addressed the issue of property value changes associated with high voltage transmission lines[2]. This document looked at approximately 30 papers, articles and court cases covering the period from 1987 through 1999.

> *In general there are two types of property value impacts that can be experienced by property owners affected by a new transmission line. The first is a potential economic impact associated with the amount paid by a utility for a right-of-way (ROW) easement. The second is the potential economic impact involving the future marketability of the property.*
>
> *However, substantial differences may exist between people's perceptions about how they would behave and their actual behavior when confronted with the purchase of property supporting a power line.*
>
> *The presence of a power line may not affect some individual's perceptions of a property's value at all. These people tend to view power lines as necessary*

[2] Final Environmental Impact Statement , Arrowhead –Weston Electric Transmission Line Project, Volume I, Public Service Commission of Wisconsin Docket 05-CE-113, October 2000, pg 212-215

> *infrastructure on the landscape, similar to roads, water towers and antenna. They generally do not notice the lines nor do they have strong feelings about them.*

The Final EIS provides six general observations from the studies it evaluated. These are:

- The potential reduction in sale price for single family homes may range from 0 to 14 per cent.
- Adverse effects on the sale price of smaller properties could be greater than effects on the sale price of larger properties.
- Other amenities, such as proximity to schools or jobs, lot size, square footage of a house and neighborhood characteristics, tend to have a much greater effect on sale price than the presence of a power line.
- The adverse effects appear to diminish over time.
- Effects on sale price are most often observed for property crossed by or immediately adjacent to a power line, but effects have also been observed for properties farther away from the line.
- The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farm operations.

Later, the Final EIS stated, "In coastal states, such as California and Florida, the decrease in property values can be quite dramatic; in states within the Midwest (Minnesota, Wisconsin and the Upper Peninsula of Michigan), the average decrease appears to be between 4 and 7 percent."

Finally, the EIS succinctly summarizes the dilemma in its closing paragraph which stated, "It is very difficult to make predictions about how a specific transmission line will affect the value of specific properties."

Mitigative Measures

Socioeconomic impacts resulting from the Project would be primarily positive with an influx of wages and expenditures made at local businesses during the Project construction. Mitigative measures are not necessary.

In the matter of property values, potential impact would typically be a negotiated settlement in an easement agreement between the Applicants and the landowner. In this case, the incremental differences among the existing 69 kV, the proposed 115 kV overhead, or the distribution lines with an undergrounding option, would be difficult to evaluate.

6.3 Displacement

Chisago County is growing rapidly and has a number of new housing developments along the proposed route, the largest of which are located along CSAH 19 and County Road 82. These

homes are primarily single-family, and many of the developments have not completed construction.

There are approximately 212 homes within 300 feet of the transmission line ROW. In addition, there is one school and church in the City of Lindstrom within 100 feet of the transmission line.

Potential Impacts

The HVTL route is planned to minimize impacts on residents and businesses by utilizing existing ROW for 97 percent of its length. Displacement of a business or home would occur only if the final location of the transmission line would be too close to a building and NESC requirements would necessitate relocating it. There is no structure along the route of this Project that would require relocation. Displacement of residential homes or businesses is not anticipated.

Mitigative Measures

Since no relocations would occur, no mitigative measures are required.

6.4 Anticipated Noise Impacts

Noise is measured in units of decibels ("dB") on a logarithmic scale. The A weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. For example, a noise level change of 3 dBA is barely perceptible to average human hearing while a 5 dBA change in noise level is noticeable. Two sources of noise would be associated with the completed Project: conductors and substations.

Land use activities associated with residential, commercial, and industrial land are grouped together into Noise Area Classifications (NAC). Residences, which are typically considered sensitive to noise, are classified as NAC 1. Each NAC is assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) noise limits for land use activities within the NAC. Table 8 shows the Minnesota Pollution Control Agency (MPCA) daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a 1-hour period; L50 is the dBA that may be exceeded 50 percent of the time within an hour, while L10 is the dBA that may be exceeded 10 percent of the time within 1 hour.

Table 8. MPCA Daytime and Nighttime Noise Limits

Noise Area Classification	Daytime		Nightime	
	L50	L10	L50	L10
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Typical noise sensitive receptors along the route would include residences, churches, and schools; however, most of the land use along the route is rural agricultural land. Current average noise levels in these areas are typically in the 30 to 40 dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of rustling vegetation and infrequent vehicle pass-bys. Higher ambient noise levels, typically 50 to 60 dBA, would be expected near roadways, urban areas and commercial and industrial properties in the project area. Conductor and substation noise would comply with state noise standards.

Noise concerns for this Project may be associated with both the construction and operation of the energy transmission system. Construction noise is expected to occur during daytime hours as the result of heavy equipment operation and increased vehicle traffic associated with the transport of construction personnel to and from the work area. Any exceedences of the MPCA daytime noise limits would be temporary in nature and no exceedences of the MPCA nighttime noise limits are expected for this Project.

Operational noise would be associated with the transmission conductors and transformers at substations that may produce audible noise under certain operational conditions. The level of noise depends on conductor conditions, voltage level and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp or rainy weather conditions, transmission lines can create a subtle crackling sound due to the small amount of electricity ionizing the moist air near the wires. During heavy rain, the general background noise level is usually greater than the noise from a transmission line and few people are in close proximity to the transmission line in these conditions. For these reasons, audible noise is not noticeable during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, the proposed transmission lines may produce audible noise higher than rural background levels. During dry weather, audible noise from transmission lines is an imperceptible, sporadic crackling sound.

The nearest residence to the Appleton substation is approximately 340 feet away, and is shielded by a windrow. Changing the transmission voltage at this substation would not result in perceptible changes in noise for the residence. The nearest residence to the Dawson substation is approximately 360 feet away, across U.S. Highway 212. Changing the transmission voltage at this substation, and expanding the substation to the north (away from the residence) would not result in perceptible changes in noise for the residence. The nearest residence to the Canby substation is approximately 1,500 feet away, and is shielded by a windrow. Changing the transmission voltage at this substation would not result in perceptible changes in noise for the residence. Table 9 shows the predicted noise levels at different distances from the proposed 115 kV transmission line.

Table 9. Predicted Audible Noise from HVTL

Conductor Size	Distance from center of transmission line corridor (feet)								
	-300	-200	-100	-50	0	50	100	200	300
115 kV transmission line	21	23	26	29	31	29	26	23	21

Potential Impacts

Noise levels produced by 115 kV and 161 kV transmission lines and substations are usually not audible and have not been demonstrated to approach even the most stringent state standards. Additionally, the majority of the Project is located adjacent to roadways, and traffic noise would overpower any Project-related noise emissions. Noise impacts from the Project are not anticipated.

Mitigative Measures

To mitigate noise levels associated with construction activities, work would be limited to daytime hours between 7 a.m. and 10 p.m. on weekdays. Occasionally there may be construction outside of these hours or on a weekend if the company is required to work around customer schedules, line outages, or has been significantly impacted due to other factors. Heavy equipment would also be equipped with sound attenuation devices such as mufflers to minimize the daytime noise levels.

No mitigation measures are required for the operational phase of the line as operational noise levels are not predicted to exceed the state noise limits.

6.5 Radio and Television Interference

Corona on transmission line conductors can generate electromagnetic noise at frequencies at which radio and television signals are transmitted. This noise can cause interference (primarily with AM radio stations and the video portion of TV signals) with the reception of these signals depending on the frequency and strength of the radio and television signal. However, this interference is often due to weak broadcast signals or poor receiving equipment.

The most significant factor with respect to radio and television interference is not the magnitude of the transmission line induced noise, but how the transmission line induced noise compares with the strength of the broadcast signal. Very few radio noise problems have resulted from existing 115 kV transmission lines, as broadcast signal strength within a radio station's primary coverage area is great enough that adequate signal to noise ratios are maintained.

If radio interference from transmission line corona does occur with AM radio stations presently providing good reception, satisfactory reception can be obtained by appropriate modification of (or addition to) the receiving antenna system.

Interference with FM broadcast station reception is generally not a problem because:

- corona generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 megahertz (MHz)), and
- the excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and behind a large metallic structure (such as a steel tower) may experience interference because of signal blocking effects. Movement of either mobile unit so that the metallic structure is not immediately between the two units should restore communications. This would generally require a movement of less than 50 feet by the mobile unit adjacent to a metallic tower. Noise in the frequency range of cellular type phones is almost non-existent and the technology used by these devices is superior to that used in two-way mobile radio.

As in the case with AM radio interference, corona-generated noise could cause interference with TV picture reception because the picture is broadcast as an AM signal. The level of interference depends on the TV signal strength for a particular channel (TV audio is an FM signal that is typically not impacted by transmission line radio frequency noise).

Due to the higher frequencies of the TV broadcast signal (54 MHz and above), 115 kV transmission lines seldom result in reception problems within a station's primary coverage area. In the rare situation that the proposed transmission line would cause TV interference within a broadcast station's primary coverage area where good reception is presently obtained, Xcel Energy would work with the affected party to correct the problem. Usually any reception problem can be corrected with the addition of an outside antenna.

TV picture reception interference can also be the result of a transmission structure blocking the signal to homes in close proximity to a structure. Because the structures proposed for this Project would be wood, except through downtown Lindstrom, this is unlikely to occur. However, measurements can be made to verify whether a structure is the cause of reception

Mitigative Measures

No interference issues are anticipated with this project, however, should such interferences be identified, the Applicants would be required to resolve the problem as a condition of the HVTL Route Permit

6.6 Aesthetics

The proposed Project would result in limited perceptual changes to the viewshed. The proposed route follows the existing transmission line, and the proposed structures would be similar to, but slightly taller than the existing structures along the route. The proposed transmission line follows the existing line through cultivated lands, several areas of forested land, and numerous areas of open water and wetlands. The proposed transmission line also passes through the cities of Center City, Shafer and Taylors Falls as well as the central business district of Lindstrom.

The line also passes through the St. Croix National Scenic Riverway. The St. Croix River's scenic and recreational qualities are one of the primary factors in its inclusion in the Wild and Scenic Rivers (WSR) Act of (P.L. 90-542). The WSR Act requires management agencies to protect and enhance the values that caused them to be eligible for inclusion in the National Wild and Scenic Rivers System. The National Park Service (NPS), MN DNR and Wisconsin DNR

jointly manage the Lower Riverway. The Lower St. Croix River is also protected in Minnesota under the Minnesota Wild and Scenic Rivers Act, specifically the Lower St. Croix Wild and Scenic River Act (Minnesota Statutes § 103F.351) The route crosses the Lower St. Croix Riverway, and the river is managed as a recreational river at this point.

Potential Impacts

Although the transmission line would be visible throughout most of its length, it is not incompatible with its setting amongst existing transmission lines, public transportation corridors and residential development along the route.

The Project must descend the west bluff and cross the St. Croix River to reach the St. Croix Falls Substation. The proposed crossing is located at the Xcel Energy St. Croix Falls Hydroelectric Plant between the cities of Taylors Falls and St. Croix Falls. There is currently one 69 kV transmission line and three overhead distribution lines that cross the river at this location. An existing 34.5 kV line which crossed above the hydroelectric plan was removed five years ago.

Minnesota Rule 4400.3350 prohibits the routing of an HVTL through state or national parks and state Scientific Natural Areas unless the HVTL would not "materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists." Although it is administered by the NPS and the MN DNR, the Riverway is not a state or national park. Additionally, impacts to the visual character of the St. Croix River would be avoided by utilizing an existing crossing location and reducing the number of lines crossing the river. No structures would be placed in the River, and no construction would occur within the river.

Mitigative Measures

Where appropriate, self-supporting steel poles would be used to minimize the use of guy wires. To minimize visual impacts to forests and open spaces, wooden poles would be used where feasible.

Additionally, the viewshed would be improved by the fact that the transmission line would be buried from the top of the west bluff to TH 95. There are currently two parallel cleared corridors approximately 100 feet apart that cut through the wooded bluff slope. The existing transmission and distribution lines sharing the southern cleared corridor would be removed, allowing the tree canopy to completely fill in the southern cut. The northern, narrower cut corridor contains a double circuit distribution line. The Project would also remove these structures. A corridor free of trees would still need to be maintained at ground level above the buried transmission line along the northern corridor. Completely filling in the large southern cut corridor and removing the existing overhead transmission and distribution structures from both corridors would improve the visual continuity of the western bluff.

In crossing the St. Croix River, the project would actually reduce the clutter of wires currently crossing at the proposed location near the hydroelectric plant. Xcel Energy would remove old,

unused conductors that would result in a net reduction of 10 wires crossing the river (the removal of 15 existing wires crossing the river and installation of three conductors and two shield wires).

In the city of Lindstrom, the existing transmission line poles also carry distribution, phone lines and other utilities. The Project involves replacing the existing 69 kV line using steel poles and longer spans, thus eliminating 5 of the 12 poles in the downtown area. The figures below provide a view of the current 1st Avenue configuration and a simulated view of that same area following construction.

Figure 2. Existing Configuration on 1st Avenue in Lindstrom

Figure 3. Xcel Energy Proposed Configuration

Construction of the new transmission line structures in Lindstrom could include aesthetic enhancements such as removing existing distribution service lines where feasible, underground distribution service lines or underground compatible designs that would allow the City to eventually place most or all of the distribution service lines underground. (See Section 7.1 for a discussion of potentially undergrounding the transmission line.) The proposal offers a potentially less cluttered appearance of fewer poles. This would limit visual impact to the business district and residences along this ROW.

6.7 Public Health and Safety Including EMF

Proper safeguards would need to be implemented for construction and operation of the facility. The Project would be designed to comply with local, state, NESC and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and ROW widths. Xcel Energy construction crews and/or contract crews would comply with local, state, NESC and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures would be followed during and after installation of the transmission line. This would include clear signage during all construction activities.

The transmission line would be equipped with protective devices to safeguard the public from the transmission line if an accident occurs and a structure or conductor falls to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment would de-energize the transmission line, should such an event occur. In addition, the substation facilities would be fenced and access limited to authorized personnel. The underground portion of the line would be properly marked, and manhole covers would be heavy enough to prevent unauthorized access. The costs associated with these measures have not been tabulated separately from the overall Project costs since these measures are standard practice for Xcel Energy.

Electric and Magnetic Fields

Voltage transmitted through any conductor produces both an electric field and a magnetic field in the area surrounding the wire. The electric field associated with HVTLs extends from the energized conductors to other nearby objects. The magnetic field associated with HVTLs surrounds the conductor. Together, these fields are generally referred to as electromagnetic fields, or EMF. These effects decrease rapidly as the distance from the conductor increases.

Electric Fields

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with a high voltage transmission line extends from the energized conductors to other nearby objects such as the ground, towers, vegetation, buildings and vehicles. The electric field from a transmission line gets weaker as one moves away from the

transmission line. Nearby trees and building material also greatly reduce the strength of transmission line electric fields.

The intensity of electric fields is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/M). Transmission line electric fields near ground are designated by the difference in voltage between two points (usually 1 meter). Table 10 provides the electric fields at maximum conductor voltage for the proposed transmission lines. Maximum conductor voltage is defined as the nominal voltage plus five percent.

Table 10. Calculated Electric Fields (kV/m)

	Distance to Proposed Centerline								
Type	**-300'**	**-200'**	**-100'**	**-50'**	**0'**	**50'**	**100'**	**200'**	**300'**
Existing 69 kV Line	0.003	0.008	0.03	0.11	0.17	0.13	0.04	0.008	0.003
Proposed 115 kV Line	0.01	0.02	0.07	0.2	0.3	0.3	0.07	0.02	0.01
Proposed 161 kV Line	0.017	0.04	0.15	0.46	0.7	0.43	0.16	0.04	0.16

The proposed 161 kV transmission line would have a maximum magnitude of electric field density of approximately 0.70 kV/M underneath the conductors, one meter above ground level, whereas the 115 kV transmission line would be approximately 0.3 kV/M. This is significantly less than the maximum limit of 8 kV/M which has been a permit condition imposed by the Minnesota EQB and PUC in other High Voltage Transmission Line (HVTL) applications. The Minnesota EQB standard was designed to prevent serious hazard from shocks when touching large objects parked under extra HVTL of 345 kV or greater.

Magnetic Fields

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with a high voltage transmission line surrounds the conductor and decreases rapidly with increasing distance from the conductor. The magnetic field is expressed in units of magnetic flux density, expressed as milligauss (mG).

The calculated magnetic flux density table (see Table 11), provides the estimated magnetic fields based on the proposed lines and structure designs and an115 kV underground alternative. The expected magnetic fields for the structure type and voltage have been calculated at various distances from the center of the pole. As the table shows, magnetic fields are expected to be higher directly over any underground segment, when compared to levels directly below an overhead transmission line segment. This is consistent with other studies comparing EMF levels of buried versus overhead transmission lines. Generally, levels are slightly higher for buried segments directly over the line; however, the levels quickly decline with distance, and EMF levels are comparable to or lower than those associated with overhead lines within a short distance (generally within 20 feet).

Table 11. Calculated Magnetic Flux Density (milligauss)

Line Type	Under Build	Condition	Amps	Distance from Centerline of Transmission Line														
				-300	-250	-200	-150	-100	-50	-25	0	25	50	100	150	200	250	300
115 kV/115 kV double-circuit	No	average	221/587	1	1.4	2.1	3.6	7.6	22	41	61	54	28	9	4.2	2.4	1.5	1
		peak	382/1014	1.6	2.4	3.6	6.3	13	37	70	105	94	49	16	7.2	4.1	2.6	1.8
115 kV single-circuit	Yes	average	587	0.6	0.9	1.4	2.5	5.5	17	33	47	30	16	5.6	2.7	1.6	1.1	0.8
		peak	1014	1	1.5	2.4	4.3	9.4	29	56	78.4	51	27	9.5	4.7	2.8	1.8	1.3
161 kV single-circuit overhead	Yes	average	387	0.5	0.8	1.2	2.1	4.6	14	26.5	36	23	12.3	4.4	2.2	1.3	0.9	0.6
		peak	667	0.9	1.3	2	3.6	7.7	23	44	59	39	21	7.6	3.7	2.2	1.5	1
161 kV single-circuit under ground	No	average	387	0.1	0.1	0.1	0.2	0.4	1.3	4.5	52	3.9	1	0.2	0.1	0.1	0.1	0.1
		peak	667	0.1	0.1	0.2	0.3	0.6	2.2	7.7	90	6.7	1.7	0.4	0.2	0.1	0.1	0.1
115 kV single-circuit under ground	No	average	542	0.1	0.1	0.2	0.3	0.5	1.8	6.3	73	5.4	1.4	0.3	0.1	0.1	0.1	0.1
		peak	934	0.1	0.3	0.3	0.4	0.9	3.1	11	126	9.4	2.3	0.5	0.2	0.1	0.1	0.1

It can be noted that magnetic fields are not singularly associated with power lines. Every person has exposure to these fields to a greater or lesser extent throughout each day, whether at home or in schools and offices. The following table contains field readings for a number of selected, commonly encountered items. These reading represent median readings, meaning one might expect to find an equal number of readings above and below these levels.

Table 12. Magnetic Fields (milligauss) From Common Home and Business Appliances

Type	Distance From Source in Feet			
	0.5	1	2	4
Computer Display	14	5	2	-
Fluorescent Lights	40	6	2	-
Hairdryer	300	1	-	-
Vacuum Cleaners	300	60	10	1
Microwave Oven	200	40	10	2
Conventional Electric Blanket	39.4 peak 21.8 average			
Low EMF Electric Blanket	2.7 peak .09 average			

Source: EMF In Your Environment, EPA 1992

Stray Voltage

Stray voltage is defined as a natural phenomenon that can be found at low levels between two contact points in any animal confinement area where electricity is grounded. As required by code, electrical systems, including farm systems and utility distribution systems, must be grounded to earth to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When a portion of this NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution, ground currents, EMF or earth currents.

Stray voltage has been raised as a concern on some dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or

the wiring on a farm was directly under and parallel to the transmission line. These circumstances are considered in installing transmission lines and can be readily mitigated.

Potential Impacts

Many years of research on the biological effects of electric fields have been conducted on animals and humans. No association has been found between exposure to electric fields and human disease. The possible effect of EMF exposure on human health has been a matter of public concern over the past few years. While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or even health effects continues to be the subject of research and debate.

The most current and exhaustive reviews of the health effects from power-frequency fields conclude the evidence of health risk is weak and do not support the allegation of a major public health danger. The National Institute of Environmental Health Sciences (NIEHS) issued its final report on June 15, 1999, following six years of intensive research. The NIEHS concluded that the scientific evidence that extra low frequency EMF exposures pose any health risk is weak. The NIEHS was the lead government agency in directing and carrying out a congressionally mandated research program on EMF.

The Minnesota Department of Health (MDH) issued *An Assessment of Health Effects Research on Electric an Magnetic Fields* in January of 2000. The MDH concluded there is not a cause and effect relationship between magnetic fields and any biological response.

> *…the current body of evidence does not show that exposure to these fields is a health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer or any other adverse human health effect.*
>
> *The current body of research lacks fundamental evidence to support a cause and effect relationship between magnetic fields and childhood leukemia. This conclusion is based on laboratory studies, which have failed to demonstrate adverse health effects or a plausible biological mechanism of causation (in vivo and in vitro).*
>
> *As with many other environmental health issues, the possibility of a health risk from EMF cannot be entirely dismissed. The MDH considers it prudent public health policy to continue to monitor the EMF research and to support prudent avoidance measures, such as providing information to the public regarding EMF sources and exposure.*

There are currently no federal or Minnesota exposure standards for magnetic fields. Florida and New York are the only two states in the country that have set standards for magnetic field exposure (150 milligauss limit in Florida and 200 milligauss limit in New York). These

exposure limits were not based on scientific analysis, but in response to maintaining transmission systems within historic levels.

Past decisions have reflected that the scientific data does not show any significant risk of health effects due to exposure to magnetic fields. Policy decisions have continued to support the construction of electric infrastructure, taking into consideration the most recent information available on the issue.

Most recently, the World Health Organization provided an update, issuing Fact sheet N°322, *Electromagnetic fields and public health: Exposure to extremely low frequency fields*, June 2007. In many studies, a weak, statistical link between exposure to EMF and incidence of childhood leukemia has been noted. Additionally, some epidemiologic studies making a regression analysis of leukemia cases have found a statistical association. A similar link has not been noted with other types of cancer. In its report, after reviewing recent studies, WHO concludes that laboratory evidence does not support these findings:

> *… epidemiological evidence is weakened by methodological problems, such as potential selection bias. In addition, there are no accepted biophysical mechanisms that would suggest that low-level exposures are involved in cancer development. … Additionally, animal studies have been largely negative. Thus, on balance, the evidence related to childhood leukaemia is not strong enough to be considered causal. … Regarding long-term effects, given the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukaemia, the benefits of exposure reduction on health are unclear.*

Mitigative Measures

As per the MDH White Paper recommendations concerning "prudent avoidance," Xcel Energy routinely provides information on the issue to the public, interested customers and employees. This information contains references to studies, and provides data to help explain the relative impact of transmission line exposure to other EMF exposures most people experience throughout the day at home or at work. Xcel Energy also provides measurements for landowners, customers and employees who request them. In addition, Xcel Energy would use structure designs that minimize magnetic field levels and, where practicable, site facilities in locations affecting the fewest number of people.

6.8 Recreation

Recreational opportunities in Chisago County include hiking, biking, canoeing, boating, fishing, camping, equestrian riding, swimming, hunting, snowmobiling and nature observation. Interstate State Park and the St. Croix National Scenic Riverway are public lands managed for a variety of outdoor recreational activities.

Interstate State Park, located just south of Taylors Falls, is near the Project area of the transmission line. Interstate State Park, which was founded in 1895, is administered by the MN

DNR and offers year-round outdoor recreational opportunities involving camping, fishing, sightseeing, rock climbing and tours of the park. The route of the transmission line would run approximately 1,000 feet north of Interstate State Park at the closest point and would not cross or impede on any park boundaries.

The proposed route runs adjacent to Cherry Hill Park, a city park in Taylors Falls. The park consists of an open lawn and a small rink that is likely used for ice skating in the winter. Section 6.5 discusses the St. Croix National Scenic Riverway. Recreationalists use the river for canoeing, fishing, and riverboat rides. Segment 3 crosses two snowmobile trails and Segment 4 crosses one snowmobile trail. No Nature Conservancy Preserves, state Scientific and Natural Areas (SNA), or state and regional trails are within the immediate vicinity of the Project area.

Potential Impacts

Visual impacts would be the only potential impact to the aforementioned public lands. No impacts to snowmobilers are expected. The points where the route crosses snowmobile trails are along rebuild portions; the change in structure type would not have an effect on the snowmobilers' recreational experience. At the closest point, a snowmobile trail passes approximately 0.3 miles from the proposed new Lawrence Creek Substation. Although the substation may be visible from the trail, it is not expected to discernibly change the view for snowmobilers. Due to the distance between the proposed transmission line route and Interstate State Park, there should be no visual impact from the Project on the park. The undergrounding of the line adjacent to Cherry Hill Park would result in a beneficial change to the view from this City Park. There should also be minimal visual impact to recreationalists from the transmission line crossing at the St. Croix River.

Mitigative Measures

The transmission line would not impact any new areas not already affected by transmission lines along designated public lands and therefore no mitigation is necessary or proposed.

6.9 Land-based Economies

Agriculture

Chisago County has a strong agricultural base. In 2002, the number of farms in Chisago County was 943, of which 457 were farms with operators that farmed as their principal occupation. The median size of farms in Chisago County is 76 acres. According to the United States Department of Agriculture (USDA) 2002 Census of Agriculture, the largest crops by acreage were corn and soybeans; in addition these farms produce a variety of agricultural products including oats, hay, beef and dairy cattle, swine, sheep, vegetables and other harvested crops.

Potential Impacts

No long-term impacts are anticipated to the agricultural economy for the Project. During construction, temporary impacts such as soil compaction and crop damages within the ROW may occur. There would be some permanent impacts to farmland throughout the Project area associated with pole placement and substation expansion. The impacts due to pole placement would be minimal, with the majority of the temporary permanent impacts related to the construction of the new Lawrence Creek Substation. Temporary impacts to agricultural land due to the substation and new alignments are estimated to be 4.4 acres. Permanent impacts to agricultural lands are estimated at 4.1 acres for the substation and less than 0.01 acres for the transmission line. Of this, approximately 3.3 acres would be prime farmland, and approximately 0.48 acres would be prime farmland when drained. This small loss of land is not expected to affect the overall agricultural land uses in Chisago County.

Mitigative Measures

By following existing ROW for the majority of the line, Xcel Energy has attempted to minimize impacts from the Project to agricultural and other land uses. When possible, Xcel Energy would construct the Project before crops are planted; otherwise Xcel Energy would compensate landowners for crop damage and soil compaction that occurs as a result of the Project. Soil compaction would be addressed by compensating the farmer to repair the ground or by using contractors to come in and chisel plow the site.

Forestry

Historically, Chisago County has developed an economically viable forestry industry, although there are no managed forestry resources crossed by the Project. The route does not impact any managed forests or nurseries. No privately-owned forest production industry would be affected by the Project.

Potential Impacts

Because the route follows existing ROW for 97 percent of its length, clearing of trees would be minimal. Impacts to forested areas and shelterbelts along the rebuild portion of the route would be incidental, and would be limited to the amount necessary to permit safe and reliable operation of the transmission line. Due to safety concerns, any trees that would grow taller than 15 feet within the ROW would need to be removed beneath overhead lines. Additionally, a 10-foot radius around each structure would be kept free of woody vegetation. The area above the buried section of transmission line in Taylors Falls would need to be kept cleared of large trees. Approximately 0.25 acres of trees along a narrow steep slope east of the Lawrence Creek Substation would be impacted as a result of the new 161 kV line alignment. The wooded slope extends both north and south of the substation, so impacts are unavoidable.

Mitigative Measures

Construction staging areas would be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. The area would be regraded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that would facilitate natural revegetation and provide for proper drainage and prevent erosion.
Clearing for access roads would be limited to only those trees necessary to permit the passage of equipment. Temporary access roads would be restored to native vegetation. Native shrubs that would not interfere with the safe operation of the transmission line would be allowed to reestablish in the ROW. However, vegetation that may interfere with the construction, operation or maintenance of the transmission line would be removed.

Mining

According to the Division of Land and Minerals (DLM) of the MN DNR, there are no mineral mines or areas of potential mineral mines in Chisago County. There are many aggregate mining operations (gravel and sand pits) within the county. According to the DLM, the transmission line does not cross active aggregate mining operations. In the Project area there are both current aggregate mining operations and potential resources along the Sunrise and St. Croix rivers. The quality of the aggregate near where the Project crosses the Sunrise River is classified as "less desirable sand and gravel deposits." The transmission line crosses areas of "highly to moderately desirable bedrock deposits," "highly desirable sand and gravel deposits," "moderately desirable sand and gravel deposits" and "less desirable sand and gravel deposits" near Taylors Falls.

Potential Impacts

Since there are no mineral mining or "known but undeveloped resources" in Chisago County, the Project has no potential impact on mineral mines. The transmission line would not adversely impact active sand and gravel mining operations in the County. The impact along the transmission line would be limited to the footings of the power poles, restricted excavation access in the vicinity of the transmission lines, and the boring for the underground portion of the Project near Taylors Falls. Additionally, the Project would be constructed in the existing ROW and the number of transmission line poles may be reduced. Any potential aggregate resources in the ROW would have already been impacted in terms of their availability for development. Therefore, there would be no additional impacts on potential aggregate resources in the Project area.

Mitigative Measures

Because no impacts are anticipated, no mitigation is required.

6.10 Commercial, Industrial, Residential Land Use

The lands that the transmission line crosses are zoned agricultural, and rural residential. During an Xcel Energy field survey, construction and development in the area west of the City of Lindstrom on CSAH 14 was observed. Adjacent lands owned by the City of Lindstrom were also being developed. The line crosses Agricultural zones within the areas outside of Taylors Falls. The proposed Lawrence Creek Substation would be constructed on land that is zoned agricultural within Chisago County. The land occupied by the substation equipment would be removed from agricultural production. The remaining area may be available for lease to continue farming operations.

The Project would cross three municipalities: Lindstrom, Center City and Taylors Falls. There are approximately 212 homes and 48 businesses within 300 feet of the proposed ROW along the entire route. Lindstrom and Center City account for approximately 147 of these properties. Approximately 10 to 15 new homes are within 150 feet of the existing transmission line, in the northwest corner of the City of Lindstrom. Other lots in this area were being graded for construction in the fall of 2006, and it is likely that additional homes would be built in the near future. According to the Lindstrom zoning map, there are 39 lots planned for development within 300 feet of the transmission line.

The transmission line would cross the northern edge of the Central Business District in the City of Lindstrom, but would avoid the main commercial district along U.S. Highway 8. The route passes through land zoned for residential uses in Center City, although the current land use is commercial along U.S. Highway 8. The line avoids the central business district of Center City. In the City of Shafer, the route passes through land annexed in 2003 that is zoned for medium-density single-family residential uses. Approximately 12 to 15 new homes are within 150 feet of the existing transmission line in this newly-annexed segment of Shafer. Grading has occurred for more homes so it is likely that several more houses would be within 100 to 300 feet of the transmission line.

In Taylors Falls, the route passes through land zoned for agricultural-residential, single-family residential, single and two-family residential and shoreland. As it crosses the St. Croix River, the route passes through the St. Croix Scenic River District. This district corresponds to the National Park Service Scenic Riverway boundary; land use in this district is generally scenic and recreational. The route passes along the northern edge of the Taylors Falls Central Business District.

Potential Impacts

The route minimizes impacts to existing land uses by following existing transmission ROW for approximately 97 percent of its length. The rebuild segments of the line would not affect existing or proposed land uses. Approximately 0.32 acres of land would be impacted due to the expansion of Lindstrom Substation. However, the Project should not affect future land use in the vicinity of the expansion due to limitations for any residential development in this area. The route is adjacent to areas of new development around Lindstrom and Shafer City. Impacts to

these new developments are expected to be minimal because the line is adjacent to roadways through these areas, and would be rebuilt along existing transmission ROW.

Burying the transmission line and reducing the number of wires crossing the river would not negatively impact land uses in Taylors Falls and would likely improve the scenic river district land use by improving the viewshed.

Mitigative Measures

In general, the rebuild portions of the line would not impact existing or proposed land use; therefore, no mitigation is necessary. Xcel Energy would work with Chisago County, city staff and business owners to ensure that impacts to land use from the construction of the line are minimized and addressed.

6.11 Public Services

There are four cities with public services that are within the transmission line ROW. Public services available to these communities include police and fire (full-time and volunteer) departments, EMT and local government services. There are underground local utility lines in the vicinity of the proposed buried portion of the transmission line. The Project area also is served by several television and radio providers.

According to MN DOT's 2005 Chisago County Traffic Map, TH 95 and U.S. Highway 8 carry the highest traffic volumes in the Project area (approximately 2,750 Annual Average Daily Traffic (AADT) and 7,800 to 18,500 AADT, respectively). CSAHs and County Roads in the Project area carry lower volumes, generally below 2,000 AADT. The relatively high density of large lakes in the Project area limits the number of east-west through corridors; U.S. Highway 8 is the only east-west road through both Central and Lindstrom Lakes. CSAH 19 also provides an important east-west travel corridor.

Potential Impacts

No impacts are anticipated to public services in the Project area. Existing utilities can impose constraints on the location of the buried portion of the transmission line. Xcel Energy would coordinate with local utilities (Taylors Falls public works, phone service, cable service, etc.) in order to determine which utilities are present. Gopher State One Call would be contacted prior to any construction in the buried section of the transmission line to mark any existing buried lines in order to avoid impacting these utilities.

Construction equipment to rebuild the existing transmission lines within the Project area would require an access path approximately 20 feet wide within the ROW or short spur trails from the existing road network to the ROW. Temporary guard structures would be used to string conductor over existing roads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height to avoid impacts to traffic.

There may be temporary traffic impacts associated with equipment and material delivery and worker transportation.

In the cities along the route, particularly in the constrained portions of downtown Lindstrom, construction of the transmission line may temporarily impact use of streets. Impacts could result from construction vehicles and safety perimeters temporarily blocking public access to streets and businesses. Access to modify the existing substations would be from existing roads and would only cause minor and temporary disruption to traffic.

If the transmission line is buried beneath public roadways, traffic would still be able to use the roads by utilizing flagmen for controlled lane closure. Any required temporary lane closures would be coordinated with the local jurisdictions, and would provide for safe access of police, fire and other rescue vehicles. If trenching is necessary through TH 95, Xcel Energy would coordinate with MN DOT to determine the best way to minimize impacts.

After the implementation of the standard and additional mitigation measures, the rebuild of the transmission lines and modifications to substations would involve short term localized traffic delays. The impacts resulting from construction and operation of the transmission lines and modifications to substations are not anticipated to affect regional traffic, and would only impact traffic on a short-term, localized basis.

Mitigative Measures

No impacts to public services are anticipated, and therefore no mitigation is necessary. Impacts to transportation would be localized and short term. Conductors and overhead wire stringing operations would use guard structures to eliminate delays. When appropriate, pilot vehicles would accompany the movement of heavy equipment. Traffic control barriers and warning devices would be used when appropriate. All necessary provisions would be made to conform to safety requirements for maintaining the flow of public traffic. Construction operations would be conducted to offer the least possible obstruction and inconvenience to public traffic. The construction contractor would be required to plan and execute delivery of heavy equipment in such a manner that would avoid traffic congestion and reduce the likelihood of dangerous situations along local roadways. Xcel energy would work closely with MN DOT, the county and municipalities along the route in order to minimize disruption to area traffic. Possible mitigation measures to minimize impacts to roadways, including TH 95, could include closing only one lane at a time, and constructing in off-peak hours.

6.12 Archaeological and Historic Resources

During the Project's pre-planning phase, the Minnesota State Historic Preservation Office (SHPO) was contacted to solicit comment regarding the potential need for cultural resource surveys. The U.S. Army Corps of Engineers (COE) was later identified as the lead federal agency for the proposed St. Croix River crossing.

A search of the SHPO database was conducted in order to identify previously-documented sites within one mile of the Project. A radius of one mile was used in order to determine the types of archaeological and historic resources, both identified and unidentified, that are likely to be found in the area that could be affected by the Project. The search identified three historic districts, 164 historic standing structures, one cemetery and 18 archaeological sites within one mile of the route segments. The historic standing structure sites include commercial buildings, government buildings, schools, churches, houses and barns. The archaeological sites include earthworks, artifact scatters and structural remains.

The following discussion focuses on those identified sites within 1,000 feet of the route segments, because more distant properties are not expected to be affected by the Project.

Multiple cultural resources have been identified in segments1 through 3. Archaeological sites include five sites containing mounds (earthworks) located within 1,000 feet of the Project along Segments 2 and 3. There are also three recorded sites that do not contain mounds within 1,000 feet of the Project area. Of the sites that contain mounds, three have apparently been destroyed by development, one site still contains a partial mound and one site consists of a nearly intact lone mound. The lone mound site is certified as eligible for the National Register of Historic Places (NRHP).

There is one artifact scatter in the Project area in a largely disturbed context that is within 350 feet of the Lindstrom Substation. There is also one Woodland-era artifact scatter that is certified as eligible for the NRHP within 350 feet of Segment 3; this site has been buried by fill for road construction. A remnant railroad grade located within 1,000 feet of Segment 3 was previously evaluated and recommended not eligible for the NRHP. NRHP status has not been determined for any of the remaining archeological sites other than the two mentioned above.

Nineteen historic standing structures are located in downtown Lindstrom. These structures include a hotel, a gas station, a bank, a commercial building, a water tower, two churches and 12 houses. Three of the houses are listed in the NRHP. The NRHP eligibility status of the remaining properties has not been determined. All of the properties are located within 700 feet (both north and south) of the Project area. One additional site, a schoolhouse, is located within 700 feet north of Segment 3. Its NRHP eligibility has not been determined.
The Center City Historic District encompasses 20 standing structures (one church and 19 houses) along Summit Avenue in the downtown area, which is approximately 800 feet north of the Project at the closest point. An additional 44 buildings (houses, a garage, a grocery store, the county jail, telephone office, law office, bank, depot, a church, a motel and motel office, the Park Island Hotel, a cemetery, two commercial buildings and both the new and old County Courthouses) are located throughout the remainder of the City. Only the depot, which has not been evaluated for significance, is adjacent to the Project area (less than 350 feet north of Segment 3). The remaining buildings are located more than 350 feet north of the Project area.

Within segments 4 and 5, there is one lithic scatter located near the St. Croix Falls Power Plant that is within 1,000 feet of the Project area. The NRHP eligibility of the lithic scatter has not been determined.

The John Artig Farmhouse is located adjacent to the Project area on Highway 82, and a section of the historic Point Douglas-Superior Military Road terminates at Highway 82 near where the transmission line angles to the northeast. Both of these properties are within 1,000 feet of the Project.

The Project is greater than 0.5 miles from 18 standing structures in downtown Taylors Falls, as well as the Angel's Hill Historic District in Taylors Falls. One inventoried structure, a pump house, is within 1,000 feet of the Project. Its NRHP eligibility has not been evaluated.
The St. Croix Falls Power Plant, the terminus for the transmission line in Wisconsin, has been recommended eligible for the NRHP.

The majority of the corridor has not been surveyed for archaeological properties. The 1888 and 1914 plat maps show numerous farmsteads and residences or other buildings within 350 feet of the Project area. Many of these structures are also depicted on the Stacy (1974), Lindstrom (1974) and St. Croix Dalles (1978) USGS 7.5' topographic quadrangles. None of these have been evaluated for NRHP eligibility.

Potential Impacts

Possible impacts to archaeological resources in the Project area include:

- Damage to surface soils throughout the Project area from heavy rubber-tread or metal-tracked vehicle operation.
- Subsurface excavations necessary to remove old wood power poles or install new metal poles.
- Damage to surface soils from dragging heavy objects (e.g., power poles).
- Damage to surface soils through grubbing, stump removal and grading.
- Excavation of borrow areas.

The identification of new archaeological sites is most likely to occur in Segments 4 and 5, where significant previous ground disturbance is likely to be relatively minimal.

No physical impacts are anticipated to previously-identified historic standing structures in the Project area. Visual impacts to previously-identified historic properties are unlikely because 1) there is existing transmission line along the corridor, 2) the new transmission line would result in a net reduction in the number of poles, and 3) the new poles would be comparable in scale to the existing poles. The existing wood poles range from 61 to 70 feet in height. The steel poles proposed for the downtown area would range from 80 to 90 feet above ground. The proposed increase in structure height may be noticeable from historic or potentially historic properties that are directly adjacent to the route. The change would likely not be noticeable from properties greater than one block away. Because the route is a rebuild along the existing alignment, and because fewer structures would be located in Lindstrom when compared to existing conditions, it is not anticipated that the Project would negatively affect any historic properties.

Since the majority of the Project area has not been surveyed, unidentified historic standing structures may be present in the Project area. The COE may require such properties to be identified and evaluated as part of the Section 106 process.

Mitigative Measures

Avoidance of archaeological and historic architectural properties is the preferred mitigative measure which Xcel Energy follows for all of its construction projects.

There may be impacts to unidentified archaeological properties in previously undisturbed portions of the Project area. Xcel Energy would work with the COE and SHPO during their review process to determine what areas may require surveys for the Project. Xcel Energy would carry out the appropriate field identification or construction monitoring.

There are no anticipated physical impacts to previously identified historic properties, and it is likely that physical impacts to any additional properties identified during corridor survey can be avoided. Visual impacts to identified and unidentified historic architectural properties are not anticipated.

6.13 Natural Environment

Air Quality

There are minimal air quality impacts associated with transmission line construction and operation. The only potential air emissions from a transmission line result from corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors. For 115/115 kV double-circuit, 115 kV single-circuit and 161 kV single-circuit transmission lines, the conductor gradient surface is usually below the air breakdown level.

Usually some imperfection, such as a scratch on the conductor or a water droplet, is necessary to cause corona. Ozone also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus humidity or moisture, the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short-lived. The Project area presently meets all federal air quality standards.

Potential Impacts

Currently, both state and federal governments have regulations regarding permissible concentrations of ozone and oxides of nitrogen. The national standard is 0.08 ppm on an eight-

hour averaging period. The state standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year. Calculations using the Bonneville Power Administration (BPA) Corona and Field Effects Program Version 3 (USDOE, BPA Undated) for a standard single-circuit 161 kV project, predicted the maximum concentration of 0.007 ppm near the conductor and 0.0003 ppm at one meter above ground during foul weather or worst-case conditions (rain at 4 inches per hour). During a mist rain (rain at 0.01 inch per hour), the maximum concentrations decreased to 0.0003 ppm near the conductor and 0.0001 ppm at one meter above ground level. For both cases, these calculations of ozone levels are well below the federal and state standards. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility. Given this, there would be no impacts relating to ozone for the Project.

There would be limited emissions from vehicles and other construction equipment and fugitive dust from ROW clearing during construction of the transmission line and substation. Temporary air quality impacts caused by the construction-related emissions are expected to occur during this phase of activity. The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions from primarily diesel equipment would vary according to the phase of construction but would be minimal and temporary. Adverse impacts to the surrounding environment would be minimal because of the short and intermittent nature of the emission and dust-producing construction phases.

Mitigative Measures

There would be no significant impacts to air quality; therefore, no mitigation is necessary. Temporary impacts due to construction would be minimized by using Best Management Practices (BMPs) to reduce dust emissions.

Water Quality

Surface Water

A determination of the surface water resources was conducted by reviewing the United States Geological Survey (USGS) 7.5-minute quadrangle, the National Wetland Inventory (NWI) map and the Public Waters Inventory (PWI) map.

The Project crosses an unnamed tributary to the Sunrise River, the Sunrise River, an unnamed Tributary to Center Lake, Lawrence Creek and an unnamed Tributary to Lawrence Creek. At a point near Taylors Falls, the transmission line would be installed underground, resurfacing at TH 95 west of the St. Croix River, which is a National Scenic Riverway. The Project would cross the St. Croix River at a point where existing transmission poles are located, replacing the existing structures. The route also passes near but does not cross North and South Lindstrom Lakes and North and South Center Lakes.

There are several wetlands and water bodies identified on the PWI maps for Chisago County. Table 11 is a summary of the resources along the Project route identified on the PWI map as waters or wetlands.

The transmission line would not cross any trout streams or outstanding resource value waters. Downstream (approximately 1.1 miles south) of the Project, Lawrence Creek is a designated trout stream near the St. Croix River.

Wetlands

The transmission line passes through or near several wetlands of varying sizes and characteristics. The vast majority are shallow wetlands less than 20 acres in size dominated by trees, shrubs and emergents. During an initial field survey conducted in October 2006, approximately 44 potential wetlands were identified as adjacent to or crossed by the existing transmission line. One potential wetland is located along the proposed 0.6 mile portion of the Project that is along new ROW, into and out of the new Lawrence substation. This wetland is located directly east of the proposed Lawrence Substation location. The site of the proposed Lawrence Substation does not appear to contain any wetlands. The area east of the existing Lindstrom Substation that would be affected by the expansion of the substation does not appear to be a wetland. Although the vegetation at this site contained reed canary grass, an October 2006 field visit determined that no wetland hydrology or hydric soil characteristics occur at this site. The work at the Chisago and Shafer substations would not affect wetlands.

Table 13. PWI Lakes and Wetlands within or adjacent to the Route

Name[1]	Location		
	Section(s)	Township	Range
Sunrise River	1, 13, 24	34	21
Sunrise Pool (59P)	13	34	21
Peterson Slough (60W)	12	34	21
North Lindstrom Lake (35P)	33	34	20
South Lindstrom Lake (28P)	32, 33	34	20
North Center Lake (32P)	34	34	20
South Center Lake (27P)	34, 35	34	20
Unnamed (106W)	33	34	20
Unnamed (155W)	32	34	20
Lawrence Creek	27, 34	34	19
St. Croix River	19, 24, 25, 30	34	19

[1]Public waters are identified with a number followed by a "P" (e.g., 85P) and the public waters wetlands are identified with a number followed by a "W" (e.g., 30W).

Potential Impacts

The Project proposes to replace an existing line with structures that have a similar footprint; therefore, the Project would not result in any substantial, permanent wetland impacts. Wherever

feasible, existing poles that are in wetlands or lakes would be moved to uplands. There are approximately six wetlands that cannot be spanned due to structure limitations. Minimal temporary impacts to wetlands may occur from construction activities and access to the line. Minimal temporary impacts to wetlands may occur if these areas need to be crossed during construction of the transmission ROW. However, Xcel Energy would avoid crossing wetlands during construction to the greatest extent feasible.

During construction, there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading and construction traffic. Impacts should be negligible at the St. Croix River since the location of the Project follows existing lines. The Applicant would employ erosion control BMPs and adhere to the terms and conditions of the National Pollution Discharge Elimination System (NPDES) permits and Stormwater Pollution Prevention Plan (SWPPP) during construction to protect topsoil and adjacent water resources, and to minimize soil erosion and trap it before it reaches surface water resources.

After construction, maintenance and operation activities for substation or transmission line facilities are not expected to have an adverse impact on surface water quality. The small increase in impermeable surface area, resulting from construction and expansion of the Project substations, could increase the likelihood of sediment in runoff reaching surface water features. However, the majority of the substation areas would remain as permeable surfaces. BMPs would be employed and erosion potential is not expected to be higher than under the existing land use at the sites.

Burying the transmission line from TH 95 to the St. Croix River was considered as an alternative to overhead lines. There is a large marsh between TH 95 and Chisago Street, with poles currently within its boundaries. Burying the transmission line through this section of the route would result in large temporary impacts to this wetland. Permanent impacts to this wetland could also occur as a result of burying the line if the integrity of the relatively shallow bedrock underlying it is affected, changing the drainage patterns and permeability. The proposed overhead line would be designed to minimize the number of structures within this wetland, likely reducing the number of poles when compared to existing conditions.

Mitigative Measures

Xcel Energy would maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored soil. Xcel Energy would avoid major disturbance of individual wetlands and drainage systems during construction. This would be done by spanning wetlands and drainage systems where possible. When it is not possible to span the wetland, Xcel Energy would draw on several options during construction to minimize impacts:

- When possible, construction would be scheduled during frozen ground conditions.
- Crews would attempt to access the wetland with the least amount of physical impact to the wetland (e.g., shortest route).

- The structures would be assembled on upland areas before they are brought to the site for installation.
- When construction during winter is not possible, plastic mats would be used where wetlands would be impacted.

Flora

The land adjacent to the Project is cultivated (primarily soybean and corn) and developed land. A significant amount of the agricultural land along the route is currently being converted to residential developments. The Project lies in an area comprised of species typical of rural agricultural areas, as well as the northern hardwood forest and the deciduous forest tension zones. The native vegetation and forestry groups that occur in Chisago County include hardwood forests, grassland and coniferous bogs and swamps. The Project occurs in areas that were historically maple-basswood forests, northern floodplain forests, wet prairies and coniferous bogs and swamps.

There are many natural areas along the route that could potentially provide habitat for native species. The area near the Sunrise River and Carlos Avery WMA in Segment 1 provides a variety of habitats including riparian corridors, forests and a variety of wetland types. The lakes near Lindstrom are surrounded by development, limiting the diversity of plant species in this area. Plant diversity increases as the transmission line approaches the St. Croix River, where much of the route is forested, including an area of relatively high-quality maple-basswood forest (not listed on the MN DNR County Biological Survey) that is crossed by the existing 69 kV transmission line between the Lawrence Creek Substation and Taylors Falls. In the segment of the line proposed to be buried west of TH 95, there is a maple-basswood forest that is currently bisected by two transmission and distribution line corridors. This forest has also been impacted by the surrounding residential developments. Between Chisago Street and the St. Croix River, there is a segment of maple-basswood forest that is bisected by transmission lines, residential lots and city streets.

The maple-basswood forest system is described as an upland mesic forest that lies on glacial till or river bottomlands. Commonly known as the "Big Woods," these forest types are typically dominated by sugar maple and basswood. Within the Project area, the Minnesota County Biological Survey (MCBS) identifies a small stand of maple-basswood forest north of Interstate State Park along the St. Croix River. Additionally, the MN DNR identified an Oak Forest remnant near the Sunrise River and Carlos Avery WMA in their correspondence (Appendix H). This historically dominant wooded area has been largely converted to agricultural uses.

Wet prairies, sometimes referred to as marshes or sloughs, were historically scattered throughout Chisago County as well. Marsh grasses, rushes and sedges are common throughout these wet prairies. Herbaceous species that are commonly found in these wet, open areas range from lake sedge and Canada bluejoint to blue vervain and giant goldenrod. Today, there are very few documented areas of wet prairie within Chisago County. What few do remain are primarily west

of the Project area. Between TH 95 and Chisago Street, there is a deep marsh wetland vegetated with reed canary grass and cattails. The wetland has been impacted by the adjacent roadways.

Potential Impacts

The majority of flora within habitats in the Project area is typical of what will be found in agricultural and urban settings. Since the Project would be built along the existing 69 kV transmission line ROW and no construction would be necessary in Segment 1 of the Project, no additional impacts are anticipated to native vegetation.

Permanent impacts would be minor since the transmission line would be constructed on an existing utility ROW. Additionally, no new ROW would be cleared in forested areas along the rebuild portions, resulting in minimal impacts to this resource. Temporary impacts may occur due to activities associated with pole construction, including minor vegetative clearing for excavation, leveling and heavy equipment traffic. Vegetative clearing would include felling trees along the existing transmission line route and temporarily trimming or removing any shrubs or tall grass. Similar to existing maintenance practices, trees that would grow to taller than 15 feet would be removed beneath the overhead lines. Additionally, approximately 0.25 acres of trees would be cleared along the ROW of the new 161 kV route just east of the proposed Lawrence Creek Substation. The trees in this area are along a steep, narrow ridgeline surrounded by cropped fields. Approximately 0.3 acres of vegetation would be impacted due to the expansion of the Lindstrom substation. The existing vegetation consists of Kentucky bluegrass and reed canary grass.

Along the segment of the route proposed to be buried through the forested slope in Taylors Falls, there would be a corridor maintained to be free of large trees, corresponding to the existing northern corridor. The existing southern cleared corridor would be allowed to fill in with trees.

Mitigative Measures

During construction of the transmission line, impacts to forestry and vegetative resources would be avoided whenever possible. Xcel Energy intends to utilize the existing ROW where clearance requirements have been followed for many years. Xcel Energy would minimize tree felling and shrub removal near the St. Croix River by removing only trees that would impact the safe operation of the facility. Additionally, Xcel Energy would maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources, and minimize soil erosion. Areas disturbed due to construction activities would be restored to pre-construction contours. In non-cultivated areas, reseeding would occur in a timely manner using a seed mix certified to be free of noxious weeds, if acceptable to the affected landowner.

Fauna

Lands on the western and eastern edges of the Project provide habitat for many types of organisms. Expansive, diverse wetlands and oak forest remnants provide habitat for many types of amphibians, upland game, waterfowl, raptors, small mammals, and deer along Segment 1 of

the Project. Most of the land adjacent to the route along Segments 1 through 4 is either developed or cultivated. Areas in those segments that could potentially provide habitat for local species are near North and South Lindstrom Lakes, North and South Center Lakes and unnamed streams along the route. Fauna in these areas would be those organisms typically found in urban and agricultural settings such as deer, raccoon, passerines and raptors.

Segment 5 is within Taylors Falls and ends at the St. Croix River. Fauna known to inhabit the St. Croix River area are white-tailed deer, skunks, raccoons, squirrels and a variety of birds, including bald eagles. The Five-lined Skink is a species of special concern and has been documented in Section 25, Township 34N, Range 19W, near the St. Croix River.

Potential Impacts

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the Project. Wildlife that inhabits natural areas such as near the St. Croix River could be impacted in the short-term within the immediate area of construction. The distance that animals would be displaced would depend on the species. Impacts to wildlife are anticipated to be short-term since the route primarily would be constructed along an existing transmission line ROW, and the amount of grading and clearing required is minimal. Additionally, the animals in the areas where new construction would occur (primarily the Lawrence Creek Substation) would be typical of those found in agricultural and urban settings. The new construction should not affect these animals because rural agricultural habitat would remain in the immediate vicinity. Impacts to the wooded areas near the St. Croix River and along the Project route would be avoided when possible.

Raptors, waterfowl and other bird species may also be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission line. Waterfowl are typically more susceptible to transmission line collision, especially if the line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water which serve as resting areas.

Additionally, large birds, such as raptors, could potentially be impacted by the new transmission lines through electrocution. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. However, Xcel Energy transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution.

Mitigative Measures

Xcel Energy has been working with various state and federal agencies over the past 20 years to address avian issues. Company personnel work to address problem areas as quickly and efficiently as possible. In 2002, Xcel Energy Inc.'s operating companies entered into a voluntary memorandum of understanding (MOU) to work together to address avian issues through its territory. This includes the development of avian protection plans (APP) for each state Xcel Energy Inc. serves. Currently, Public Service of Colorado is finalizing the APP for Colorado and

will begin work on the Minnesota and Wisconsin APPs. Standard reporting methods were also developed. As part of the APP, the Project would be examined for collision risks, and if a potential risk was identified, mitigation procedures would be recommended.

In cooperation with the MN DNR and the United States Fish and Wildlife Service (USFWS), Xcel Energy would identify areas where installation of swan flight diverters on the shield wire may be warranted. Xcel Energy would also coordinate with the NPS on any recommendations that agency may have for avian issues at the St. Croix River crossing. In most cases, the shield wire of an overhead transmission line is the most difficult part of the structure for the bird to see. Xcel Energy has had success in reducing collisions on transmission lines by marking the shield wires with swan flight diverters (SFD). SFDs are pre-formed spiral shaped devices made of polyvinyl chloride that are wrapped around the shield wire.

6.14 Rare and Unique Natural Resources

There are 124 occurrences of rare or unique resources identified within one mile of the Project area. These resources were identified using the MN DNR Natural Heritage Database. These resources include two federally- and state-endangered mussels (Higgins and eye and winged mapleleaf); the federally-threatened, state special concern bald eagle; the federal candidate, state-threatened spectaclecase mussel; three state-endangered species (ebonyshell mussel, wartyback mussel, and rough-seeded fameflower); 10 state-threatened species (nine mussel species and Blanding's turtle; 16 state special concern species (four fish species, four mussel species, two bird species, two reptile species, three plant species and one lichen); 11 non-listed species for which the MN DNR is gathering data for possible future listing; five freshwater mussel concentration areas; two natural communities (a rock outcrop and a maple-basswood forest); six types of unique geologic areas; and a historical (1940) record of the state-threatened peregrine falcon.

Additionally, MCBS data was consulted to determine if there were areas with medium, high or outstanding biodiversity significance along the proposed route. Areas with medium biodiversity significance are those containing significant occurrences of rare species and/or moderately-disturbed native plant communities and landscape that have a strong potential for recovery. Areas with high biodiversity significance contain sites with very good quality occurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species, the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes present in Minnesota. The route crosses one area with medium biodiversity significance, associated with the Carlos Avery WMA. There is also an area of high biodiversity significance associated with Interstate State Park, approximately a quarter mile from the proposed route.

In their correspondence, the MN DNR highlighted four resources that may be impacted by the Project, identifying ways Xcel Energy could avoid impacting these resources: an Oak Forest Natural Community, several freshwater mussel species, Blanding's turtle and the five-lined skink. The Oak Forest community is associated with the Carlos Avery WMA. The mussel

species are located in the Sunrise and St. Croix rivers. Documented Blanding's turtle occurrences are scattered throughout the Project area; there is also an area that the MM DNR considers to be of statewide importance for the turtle near Carlos Avery. The five-lined skink was documented in the vicinity of Segment 5.

In their correspondence, the USFWS identified three federally threatened or endangered species in the Project area. Two of the species are freshwater mussels that were documented in the St. Croix River. Both the winged mapleleaf and the Higgins' eye pearly mussel are federally endangered species. The USFWS also identified a bald eagle nest southeast of Center City. The bald eagle is a federally threatened species.

Potential Impacts

In general, impacts to rare and unique natural resources would be avoided because the Project is a rebuild of an existing line along 97 percent of the route. The area of new construction associated with the proposed Lawrence Creek Substation would occur in an agricultural area where native species are not likely to occur. The USFWS concluded that, "Given the location and type of activity proposed, we have determined that the Project is not likely to adversely affect the bald eagle, the winged mapleleaf mussel or the Higgins' eye pearly mussel.

Natural Communities - Oak Forest, Maple-Basswood Forest and Rock Outcrop

Impacts to the Oak Forest natural community referenced in the MN DNR correspondence are not anticipated. This natural community is located near Carlos Avery WMA, where no construction would occur for the upgrade. The maple-basswood forest and rock outcrop communities are both located in Interstate State Park. The proposed route of the transmission line would run approximately 1,000 feet north of Interstate State Park at the closest point. No impacts to natural communities in this park are anticipated.

Bald Eagle

The bald eagle nest identified southeast of Center City is approximately 0.8 miles from the Project area. No impacts are anticipated.

Mussels

Freshwater mussels were identified in the Sunrise River and the St. Croix River by the MN DNR and USFWS. No impacts are anticipated to the mussels in Sunrise River because no construction would occur in this Segment. The closest documented occurrences of mussels and mussel concentration areas are approximately 0.85 miles downstream of the proposed crossing area. Impacts to these species would be avoided by using BMPs to prevent sediment from entering the river.

Fish

State-listed fish species are documented within the St. Croix River downstream of the proposed river crossing. No direct impacts to these species' spawning areas would result from the Project because no construction would occur within the river. Indirect impacts would be avoided by using BMPs to prevent sediment from entering the river.

Five-lined Skink

In Minnesota, five-lined skinks are generally found in wooded ravines with areas of exposed bedrock. The MN DNR expressed concern over potential impacts to this species in the Taylors Falls area where the transmission line would be buried. Temporary impacts to this species could occur during construction, which could temporarily displace any skinks inhabiting the existing transmission corridor. It is estimated that temporary impacts would consist of an approximately 50-foot wide corridor along the existing 69 kV route. Construction activities would include trenching, storing excavated soil and heavy truck traffic. After the line is buried, the site would be restored to existing conditions, and vegetation would be allowed to regrow or be reseeded if necessary. There are no areas of exposed bedrock in the segment proposed to be buried between CSAH 20 and TH 95; therefore impacts to the skink are expected to be minimal. In the two areas with potential for exposed bedrock (just west of CSAH 20 and east of Chisago Street in Taylors Falls), the proposed transmission line would be overhead along the existing corridor. Whenever feasible, structures would be replaced pole for pole, minimizing any impacts to skink habitat. If a new pole location is necessary within bedrock, drilling is the preferred method. Drilling into bedrock would minimize impacts compared to blasting.

Blanding's Turtle

The Project may impact MN DNR-designated statewide important Blanding's turtle habitat that is located along Segments 1 through 5 if construction impacts turtle habitat (shallow wetlands) or nesting habitat (sandy uplands). Because the transmission line is a rebuild of an existing line for 97 percent of the route, impacts to previously undisturbed turtle habitat would be avoided. Additionally, wetlands would be spanned whenever possible, and the number of structures located in wetlands would be the same as, and most likely less than, the existing number. Temporary impacts to wetlands would be minimized to the greatest extent possible by not placing access roads in wetlands, and by constructing any poles in wetlands during winter months whenever feasible. Rebuilding the line along existing ROW would minimize impacts to upland nesting habitat.

The remainder of the documented special concern species and species with no legal status are generally associated with Interstate State Park and the Carlos Avery WMA. Impacts to these species are not anticipated because these areas would not be affected by the Project.

Areas of Biodiversity Significance

The area of high biodiversity significance within Interstate State Park would not be impacted by the Project because it is approximately a quarter mile from the route at the closest point.

Mitigative Measures

In order to protect the rare and unique resources along the Project area, appropriate measures would be implemented where necessary to prevent sediment from entering water bodies along the transmission line corridor. Xcel Energy would also provide contractors with the MN DNR's Blanding's turtle fact sheet and recommendations. The MN DNR expressed concern about impacts to freshwater mussels, Blanding's turtle and Five-lined Skinks and have provided Xcel Energy with literature and suggestions on how to avoid impacting these organisms. This information is summarized below:

Table 14. Rare and Unique Resources Mitigation

Organism	Reason for Decline	Avoiding and Minimizing Impacts
Freshwater Mussels	Runoff and physical changes to lakes and rivers.	Prevent sediment from reaching the water body by using silt fencing and rapidly revegetating disturbed soil. No construction will occur within the St. Croix River.
Blanding's Turtles	Wetland drainage and degradation, development of upland nesting areas, increase in predator populations, human disturbance	Inform workers by providing them with a Blanding's turtle flyer; Keep utility access and maintenance roads to a minimum; Below-ground utility construction returned to original grade; Construction in potential nesting areas should be limited to the period between September 15 and June 1; Turtles in imminent danger should be moved by hand out of harm's way; Mechanical maintenance of access roads during fall to spring
Five-lined Skink	Agricultural development	Recommend avoiding major alteration of habitat. Preferred habitat in Minnesota is moist, wooded or partially wooded areas with significant cover and basking sites that include rock outcrops. The Project would not significantly alter habitat. Temporary impacts in bedrock area would be minimized by replacing pole for pole when feasible, and when not feasible, drilling rather than blasting.

7.0 Potential Impacts of Alternate Routes

This section evaluates route alternatives to the Applicants proposed route. In the Alternative Routing Process, applicants are not required to provide any routes for review other than their proposed, preferred route. However, alternatives are often brought forward during the scoping processes by concerned citizens or local governments. In this case, the working group submitted the following route for further consideration.

7.1 Undergrounding through Lindstrom (Working Group Alternative 1)

The working group and the city of Lindstrom have proposed an alternative to the proposed transmission project that would underground the line through the city of Lindstrom. The underground Alternative would replace the overhead 69 kV line with an underground 115 kV line installed along the same alignment from the Lindstrom Substation to the location in Center City where the line leaves the U.S. Highway 8 corridor (for a length of approximately 2.2 miles).

In Lindstrom, the wood poles currently supporting the above ground line also support electric distribution lines and other overhead utilities. These poles would therefore remain in place if the transmission lines were built underground. The upper part of these poles could be removed. An underground line would be installed in a duct bank similar to that described in the Route Permit Application for the underground segment in Taylors Falls (see Figure 1).

Feasibility of Underground Construction

If the existing 69 kV line is upgraded to an underground 115 kV line along the existing alignment, there are implications to Xcel Energy's current ROW. If 1st Avenue becomes part of U.S. Highway 8, at least the following will need to be addressed:

- *MN DOT Issues* – MN DOT staff have indicated a concern about longitudinal private utilities below their pavement. (See the MN DOT letters in Appendix D.)
- *Room for Line* - Is there room below the sidewalk?
- *Conflict with Other Utilities* - Are there other utility installations that would complicate or prevent under the sidewalk construction?

Environmental Analysis

The route between the Lindstrom substation and Center City follows road rights of way through a developed urban area. Constructing an underground line would have several different impacts than Xcel Energy's Proposed Route (overhead line), including aesthetic, EMF, cultural resources, wetland, temporary construction and economic impacts. Because the underground route would follow the same alignment as the overhead route, this alternative would be within the same distances of residences and businesses in Lindstrom.

Aesthetic

Burying only the transmission line would have limited impacts on the viewshed of Lindstrom and Center City because structures would need to stay in place for the distribution lines and other utilities. The upper portion of the poles could be removed, shortening the structures by several feet. Any impact to aesthetics would be subjective. Although the shortening of the existing poles could have positive aesthetic effects if it results in the structures being less noticeable, the overall effect would likely be negligible.

EMF

The calculated EMF levels for the underground alternative show a higher EMF level directly above the line, but then the fields decrease faster with distance compared to levels under overhead lines. On the one hand, the level above an underground installation would average 73 mG, as opposed to 47 directly under a 115 kV line. On the other hand, within 25 feet, an average reading for the underground line would have dissipated to 5.4 mG, while the reading for the overhead line at the same distance from the centerline would be 30 mG. For a comparison of the EMF levels, see Table 13.

Cultural resources

Constructing the underground line could have greater impacts to cultural resources than rebuilding the overhead line. It is possible that lithic scatters, historic building remnants, or other cultural resources would be uncovered or disturbed by trenching for the line. The eastern portion of the alternative underground segment is near several documented burial mound sites; it is therefore possible that other undocumented burial sites could be located along the route. Because the majority of the underground route is along road ROW and other previously disturbed areas, it is unlikely that the line would disturb intact sites. However, if a burial remnant, human remains, or other significant sites were discovered during construction, construction would need to halt until the appropriate agencies have been consulted and avoidance and mitigation measures are determined and agreed to.

Wetlands

Trenching for the underground alternative would result in larger temporary impacts to wetlands than the overhead line. The 2.2 mile underground segment crosses four wetlands for a total length of approximately 1,000 feet. This would result in approximately 8,000 square feet of temporary impacts to wetlands. The overhead line in this 2.2-mile segment would avoid impacts to wetlands by spanning them.

Construction

Constructing the trench for the underground transmission line would result in greater temporary construction impacts than the overhead line. A typical progression rate for underground construction would be a few days for each 200-foot section of trench. About 500 to 700 feet of

trench is open at one time. Steel plates are typically placed over open sections of trench when crews are not at that location. This would result in access to businesses in Lindstrom being limited (although not closed) for several days to weeks at a time during construction, and local traffic would likely be rerouted to other streets, or redirected by a traffic monitor to one direction at a time along 1st Avenue.

Economic Impact Analysis

The Working Group recommended an undergrounding option through the entire city. In an effort to review a number of underground options in order to evaluate feasibility, Xcel Energy conducted a study-grade cost estimate for installing 115 kV underground transmission line through three different segments of the city of Lindstrom (see Map 7 in Appendix A):

- Option A—underground transmission line from First Avenue to St. Bridget's Church (0.33 miles);
- Option B—underground transmission line from the Lindstrom Substation to the Church (0.73 miles) and;
- Option C—underground transmission line from the Lindstrom Substation to a termination point near the Shafer Tap (Working Group Alternative #1) (2.2 miles).

The following table illustrates the incremental costs of each underground option. Incremental costs were derived by taking the estimated cost of each option and subtracting the like cost of overhead line.

Table 15. Incremental Costs of Underground Transmission in Lindstrom

Segment Options	Description	Length in Miles	Incremental Cost
Option A	1st Ave to Church	0.33	$2,286,000
Option B	Lindstrom Sub to Church	0.73	$4,564,000
Option C	Lindstrom Sub to Shaffer Tap	2.21	$12,586,000

NOTE: The above cost estimates are study-grade and are considered accurate within +/- 25%. Costs are based on 2007 dollars.

Total project costs for each option are summarized in Table 15.

Table 16. Proposed Project Including Incremental Costs

Proposed Project Including Underground Option	Total Project Cost
Overhead Proposal	$64,201,000
Option A	$66,487,000
Option B	$68,765,000
Option C	$76,787,000

NOTE: The above costs include underground sections of line through the land district of the St. Croix Riverway

The primary concern of underground construction is its compatibility with the proposed U.S. Highway 8 Project. The current 69 kV transmission line alignment relies on public rights of way rather than private easements. From discussions with MN DOT staff, there appears to be a high risk of conflicts between the transmission project and the proposed U.S. Highway 8 road project. If the transmission line were constructed below 1st Avenue prior to MN DOT initiating their project, there likely would be additional costs associated with moving the line if conflicts arise.

While it appears that construction of the proposed transmission project could possibly be coordinated with the MN DOT project, the MN DOT project is not fully funded and it is therefore uncertain when or whether the road project would be constructed.

Impacts to Property Values

There may be a slight relative impact on property values next to an underground transmission line as opposed to overhead lines, because it can be seen as aesthetically superior to the later. However, either way the line carries the same right of way and utility easement considerations. In this case, even if an underground option were employed, distribution lines would still remain within the ROW. Property values are not necessarily negatively affected by abutting a transmission right of way (see Section 6.2). Here, incremental differences through Lindstrom among the options of a 69 kV line, a 115 kV or a distribution system would be difficult to evaluate. It is unlikely that burying the transmission line would result in any measurable effects on property values, either beneficial or adverse.

City/Tourism/Economy

The existing 69 kV line has been in place since the 1950s, throughout the development of downtown Lindstrom. During this time the city and surrounding area have grown significantly (see Section 6.2). Burying only the transmission line would have limited aesthetic impacts to the downtown district for the same reasons as noted in the above paragraph. Therefore, the alternative would likely have little effect on the current or planned tourist economy for Lindstrom.

Maintenance

One major disadvantage to building underground transmission lines is the difficulty of finding and repairing failures. It can be difficult to determine the location of a failure on an underground line. Overhead failures can usually be found through visual inspection. And while overhead failures can usually be repaired in hours or days, repair on an underground system can be more complex. Underground cable failures, though rare, must first be located, then excavated and repaired. These excavated repairs can take weeks or months, depending upon the extent of damage and the availability of replacement materials, so there could be significant impacts to traffic and local businesses adjacent to the excavation.

Distribution Underground Sub-Alternative

While it was not addressed specifically in the Scoping Decision, this variation on the Underground Alternative was developed because underground construction of only the transmission line would leave the existing poles in place and would therefore not accomplish some of the assumed goals of the underground alternative (i.e., removing negative aesthetic elements and physical constraints). This alternative assumes undergrounding the distribution system as well.

Impact Analysis

The project costs would generally be those reflected in the above tables. However, there could be significant costs to property owners to change to underground service. The existing poles in downtown Lindstrom also carry electric distribution and other utilities. Xcel studied the possibility of placing these distribution lines underground as aesthetic mitigation that could be accomplished whether the transmission line is rebuilt overhead or underground. The approximate cost of installing the electric distribution lines underground along First Avenue is $400,000. This cost does not include telephone, cable TV or any other lines that may be present.

The cost presented above does not include upgrading or rebuilding customer owned service lines and equipment. For residential customers, the meter socket, fuse box or internal wiring may need to be upgraded. Commercial customers may have similar expenses in addition to replacing their service lines. Typical costs for these upgrades have been approximately $2,000 for residential customers and $2,000 to $10,000 for commercial customers. Approximately 40 customers would be affected by placing distribution lines underground in downtown Lindstrom.

Because this alternative could potentially completely remove the overhead structures from downtown Lindstrom, depending on whether or not local telephone and cable lines could also be buried, the visual difference would be more noticeable than burying only the transmission line. Burying all of the utilities would result in a more “uncluttered” viewshed in the downtown district, which would likely be perceived as a positive aesthetic impact. However, it is unclear whether this would translate into a positive economic impact to either property values or the tourist economy. Because the downtown district has developed with the existing 69 kV overhead line, it is arguable if burying the line would significantly impact future development.

7.2 Alternatives Rejected for Further Consideration

During the scoping period, EFP received several public comments on the project. Several of these comments included recommendations for alternative routes or alternatives to segments of the proposed route. Minnesota Rule 4400.2750, subp 2.B. states that these alternatives should be included in the scope of the Environmental Assessment only if “evaluation of the proposed site or route will assist in the (PUC’s) ultimate decision on the permit application.” This section reviews those alternatives and explains why they do not qualify as feasible or viable alternatives for review in the EA.

Lindstrom Bypass - Around the Lake Alternative

As an alternative to the current route between the Lindstrom and Shafer Substations, an Around the Lake route was analyzed to see if routing through the city could be avoided. This alternative would require a 7.1 mile new overhead transmission line route around the north side of North Lindstrom and North Center Lakes. The route would exit Lindstrom Substation and follow Lincoln Road for 0.5 miles, then turn east and follow 316th St. for 0.25 miles. The route would then turn north and east, following section lines cross country for approximate 1.6 miles. The route would then turn north and parallel N. Lake Trail for approximately 1.4 miles to the N. Lake Trail/Furuby Road/Oasis Road, where it would turn south and parallel Oasis Rd for approximately 2.2 miles. The route would then turn east and follow 315th St. for 0.4 miles where it would then turn south and follow an existing distribution line corridor south to the Shafer Substation.

The environmental setting is rural residential along relatively flat terrain, with houses adjacent to the roads that the transmission line would parallel. In the cross-country segments, the landscape is generally agricultural, although it appears that several areas are slated for expanded residential development. Lake houses occur directly adjacent to North Center Lake.

The costs are estimated at $495,000 per mile x 7.1 miles for this alternative, resulting in an incremental cost of approximately $3,500,000. Additionally, the ROW of way costs would need to be factored in as existing right of way would be replaced with all new ROW. Xcel Energy has estimated those costs to be an additional $583, 000.

The route would be within 300 feet of approximately 45 residences (including approximately six residences that would be within 100 feet of the new route). Construction of the line would also require clearing approximately 2,700 linear feet of trees along the right-of-way. This would result in approximately 3.1 acres of tree clearing along the alternative segment, assuming 50 feet is cleared between the road shoulder and the edge of the right-of-way. The tree clearing could affect the viewshed of residences that are currently shielded from the road by windrow trees. The addition of transmission line poles along a route that currently has no overhead structures or shorter distribution line structures would likely be seen as a negative aesthetic impact.

Additionally, the transmission line may conflict with planned development in this area. Currently there is a residential development being constructed at the intersection of Furuby Road/CSAH 20 and Oasis Road and other developments are planned in the vicinity of North Center Lake.

The new route would cross nine NWI wetlands, including one that is approximately 800 feet wide. If this wetland could not be spanned, further coordination with the ACOE would be necessary because it would involve fill in a previously un-impacted wetland.

In April 2007, HDR requested a list of all inventoried properties within one mile of the alternative transmission line route. A total of ten properties were identified in the History/Architecture database, but all ten are in downtown Center City, at least one-half mile

from the proposed corridor, and likely would not be affected by construction of the line. Seven records of archaeological sites occur within a mile of the alternative route segment, only one of which is near or adjacent to the route. This site is a scatter of historic artifacts related to School No. 19, which is no longer extant. Therefore, it is unlikely that this site, if evaluated, would meet the criteria for listing on the NRHP. However, coordination with the state archaeologist and MN SHPO still could be required for this alternative route segment. It is possible that a cultural resources survey would be necessary in order to ensure that the structures effectively span any archaeological sites that have not been documented.

Center City School Bypass

Routing the overhead transmission line south of U.S. Highway 8 near Center City School would result in rerouting approximately 1,200 feet of transmission line. This alternative would result in the closest point to school property being approximately 300 feet to the soccer field, and 140 feet to the parking lot.

The existing transmission line is currently approximately 160 feet from the residential development south of U.S. Highway 8, across from the school. Rerouting this segment would result in the line being approximately 50 feet from the closest residence in this development. Construction of the line would also require clearing an existing 670-ft long tree line between the development and U.S. Highway 8. There are 12 buildings (of multiple residential units) that would be potentially impacted by the changes to the view shed and the highway noise levels that would result.

Peak magnetic field levels at the soccer field would be approximately 1.0 mG with this alternative segment compared to approximately 4.0 mG if the line is rebuilt along the existing alignment. For the residences south of U.S. Highway 8, peak magnetic field levels would be approximately 29 mG for this alternative segment, compared to approximately 4.0 mG if the line is rebuilt along the existing alignment.

The new route would cross approximately 770 feet of NWI wetland. If this wetland could not be spanned, further coordination with the COE would be necessary because it would involve fill in a previously un-impacted wetland.

Cultural resources issues could also arise due to the presence of a burial mound remnant between the wetland and the south side of U.S. Highway 8. Coordination with MN SHPO would be required for design of this rerouted segment. It is likely that a cultural resources survey would be necessary in order to ensure that the structures effectively span any archaeological sites.

West of Lindstrom Underground Request

During the Scoping process, a developer indicated that there are plans to develop a parcel of land west of Lindstrom. The parcel is located south of the line across Stacy Trail between Wallmark Lake Drive and Marigold Lane. The length of the segment is approximately 0.5 mile. The

environmental setting in this parcel is relatively flat rural residential, with surrounding agricultural fields recently being replaced with residential developments.

Studies on transmission lines and their impacts on property values indicate that there is no significant, long term economic impact (see Section 6.2). When a transmission line is first constructed along a new alignment, some studies show that adjacent properties can experience a brief decrease in value. However, this is not a permanent effect, and after several years, property values generally return to prevailing levels. The vast majority of the studies state that transmission lines have a negligible effect on property values.

No studies were found on particular types of transmission lines, including voltage and height of the lines, and whether changing the voltage of an existing transmission line would result in an impact to property values. Because the existing studies cited above show that constructing a transmission line along a new alignment has insignificant effects on property values, it is likely that changing the structure type or voltage of an existing line along the existing alignment would have a negligible effect.

Estimated costs for constructing this segment underground are $3,342,000. As this section of line would replace an overhead segment for approximately one-half mile, at a cost of approximately $250,000, the incremental cost to underground this segment would be about $3.1 million.

Lawrence Creek Re-Route

During the scoping process two landowners requested a re-route from the existing ROW onto a new route. The subject parcels are bisected by the current ROW, which is owned by Xcel Energy, as it runs northeast from the proposed Lawrence Creek Substation. As the proposed route runs from the Lawrence Creek Substation towards the northeast, the proposed new route would continue east from where it currently turns to the northeast for another approximate 0.5 mile to where it would meet the intersection of U.S. Highway 8 and Rielke Road. From that point, the proposed re-route would turn north for approximately 0.5 mile to where it would intersect the existing ROW.

Rerouting this segment of the transmission line would require clearing approximately 530 linear feet, or 26,500 square feet (0.6 acres) of woodland, assuming that a 50 foot ROW is used. The forest in this area is medium- to low-quality mixed oak. This new segment would also place the transmission line in a new alignment where some residences that currently do not have a view of the existing 69 kV line would have transmission line structures introduced to their viewshed.

The incremental impact of this segment change would be approximately $180,000, depending on equivalent ROW costs.

Overhead Construction on River Bluff

Because undergrounding the transmission down the bluff to the St. Croix River from Taylors Falls is an expensive alternative, the question arose within the Department as to the merit of the

Applicants' proposal for this segment. In any review, incremental costs need to be considered in relation to benefits. In this case, the benefit is aesthetic and in keeping with the Wild and Scenic Rivers Act.

The DOC EFP conferred with the responsible agencies in regard to this issue. MN DNR and NPS responded to inquires as follows. See Appendix D for the agency letters.

The MN DNR responded:

> *Because of its unique status as state and federal wild and scenic riverway, the St Croix valley has additional protections.*
>
> *At our meeting in March I learned that the proposed St Croix River crossing by the dam would result in the elimination of ten overhead lines, while replacing with one new line. In addition, the existing lines extending down the bluffline on the Minnesota side would be placed underground. Both of these options are highly supported. Although there are areas adjacent to the river where the shallow depth to bedrock precludes the undergrounding of the powerline(s), such is not the case in the bluff area. Therefore, the Department would likely object to any attempt to avoid mitigating the adverse effects associated with the current powerline corridor on the Minnesota bluff. (Mike Mueller, MN DNR Area Hydrologist)*

The National Park Service responded in kind:

> *The purpose of designation under the (Wild and Scenic Rivers) Act is to protect and enhance the river's outstanding, remarkable scenic, recreational and other resource values. … A portion of the EA will evaluate whether the additional costs of placing the line underground down the west embankment are warranted. Given the purposes for which the Riverway was designated, the NPS believes that the additional costs are warranted.*
>
> *… The condition to place the power lines underground was negotiated by the cities of Taylors Falls and St. Croix Falls during the previous planning effort. … The NPS generally supports additional planning and public involvement for this project. However, it should not reverse the enhancements to scenic values that were agreed upon during the previous planning process. The NPS would object to any reversals which would increase impacts to the scenic and other resource values of the Riverway. (Tom Bradley, NPS Superintendent)*

8.0 Unavoidable Impacts

The Chisago Transmission Project would have no significant unavoidable adverse impacts. It would not have the same level of impacts that are usually associated with the construction of new transmission line due to the fact that it is a rebuild of an existing line. As the project is a rebuild, the bulk of the new impacts would be related to those short term impacts that are associated with the construction of the transmission line project. The long term impacts of the transmission line, those related to land and visual impacts, have already been realized with the existing line. As the proposed line would be located in essentially the same place as the existing line, the incremental long term impacts of changing out the structures would not result in significant changes to the transmission line. Operating the transmission line at the higher voltage level of 115 kV would also not result in a significant environmental impact. In addition, the significant ROW sharing associated with this project would further mitigate the direct impacts associated with the construction of the new line.

In addition, there are few commitments of resources associated with this project that are irreversible and irretrievable, but those that do exist are primarily related to construction. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. Construction resources that would be used include aggregate resources, concrete, steel, and hydrocarbon fuel. These resources would be used to construct the project. During construction, vehicles would be traveling to and from the site utilizing hydrocarbon fuels.

9.0 Additional Permits and Approvals Required

In an HVTL Route Permit, the PUC describes with specificity the route approved. The approved route may or may not be the route preferred by the applicant. The PUC also may impose other conditions in a permit that the PUC determines are reasonable and appropriate (Minnesota Rules part 4400.3650). Permit conditions typically relate to construction practices and administrative issues like transfer of the permit and permit amendments. As an example, see the recently issued HVTL Route Permit contained in Appendix E.

The Route Permit would also require compliance with the terms of all applicable and relevant regulatory permits and approvals. Table 16 contains a list of the anticipated permits and associated environmental approvals required for the Chisago Transmission project.

Table 17. Potential Required Permits

Permit	Jurisdiction
Local Approvals	
Utility Crossing Permit	Chisago County
Driveway Permit	City of Taylors Falls
State of Minnesota Approvals	
Certificate of Need	Public Utilities Commission
Route Permit Application (Alternative Process)	Public Utilities Commission
Utility Permit (Highway Crossings)	MN/DOT
License to Cross Public Waters	Minnesota DNR Division of Lands and Minerals
Public Water Works Permit	Minnesota DNR Division of Waters
NPDES Permit for construction activity	MPCA
State of Wisconsin Approvals	
Certificate of Public Convenience & Necessity	Public Service Commission of WI (acquired)
Chapter 30 Water Quality Permit	Wisconsin DNR
Federal Approvals	
Section 10 Permit	U.S. Army Corps of Engineers
Section 404 Approval	U.S. Army Corps of Engineers
Prime Farmland (Form AD-1066)	NRCS

Local Approvals

A Utility Permit from Chisago County would be required to work within a county road ROW. Additionally, the new Lawrence Creek Substation would require a driveway permit from the city of Taylors Falls. Xcel Energy would apply for these permits once line and substation design is complete.

State of Minnesota Approvals

An HVTL cannot be constructed without a Certificate of Need and a Route Permit approved by the Commission. A route permit under the Alternative Process requires the applicant to be eligible as outlined in Minnesota Rules 4400.2000. These regulatory processes are described in Chapter 2.

A permit from MN DOT is required for construction, placement or maintenance of utility lines that occur adjacent or across a highway ROW. These permits would be acquired once line design was completed.

MN DNR Division of Lands and Minerals regulates utility crossings on, over or under any state land or public water identified on the Public Waters and Wetlands Maps. A license to cross Public Waters is required under Minnesota Statue 84.415 and Minnesota Rule 6135. Xcel Energy would work closely with the DNR on these permits and would file for them once line design was complete.

The DNR Division of Waters regulates activities that affect the course, current and cross-section of lakes, wetlands, rivers and streams. Under Minnesota Statute 103G.245, subd. 1, a DNR Public Waters Work Permit is required to:

1. Construct, reconstruct, remove, abandon, transfer ownership of or make any change in a reservoir, dam, or waterway obstruction on public waters; or
2. Change or diminish the course, current, or cross-section of public waters, entirely or partially within the state, by any means, including filling, excavating or placing of materials in or on the beds of public waters.

Xcel Energy would determine whether this permit is necessary and, if needed, would file this permit once line design was complete.

A NPDES permit from the Minnesota Pollution Control Agency is required for storm water discharges associated with construction activities disturbing an area equal to or greater than one acre. A requirement of the permit is to develop and implement a SWPPP, which includes Best Management Practices to minimize discharge of pollutants from the site.

State of Wisconsin Approvals

The Wisconsin Certificate for Public Convenience & Necessity (CPCN) for the Project was issued on June 10, 1999 in WPSC Docket No. 4220-CE-155/1515-CE-102. The CPCN process is where the WPSC determines the need and routes for projects within Wisconsin. A revised CPCN order was issued on February 5, 2002.
.
A Chapter 30 Utility Water Quality Permit would be required from the Wisconsin DNR. This permit is required for utility crossings of navigable waters.

Federal Approvals

Section 10 of the Rivers and Harbors Act of 1899 requires approval prior to the accomplishment of any work in, over or under navigable waters of the United States, or which affects the course, location, condition or capacity of such waters.

Approval under Section 404 of the Clean Water Act is required for projects that discharge temporary or permanent fill within a water of the U.S. or within wetlands.

Appendix A –Project Maps

Appendix B – EA Scoping Decision

Appendix C – Working Group Report and Recommendations

Appendix D – Agency Letters

Appendix E – Sample Route Permit